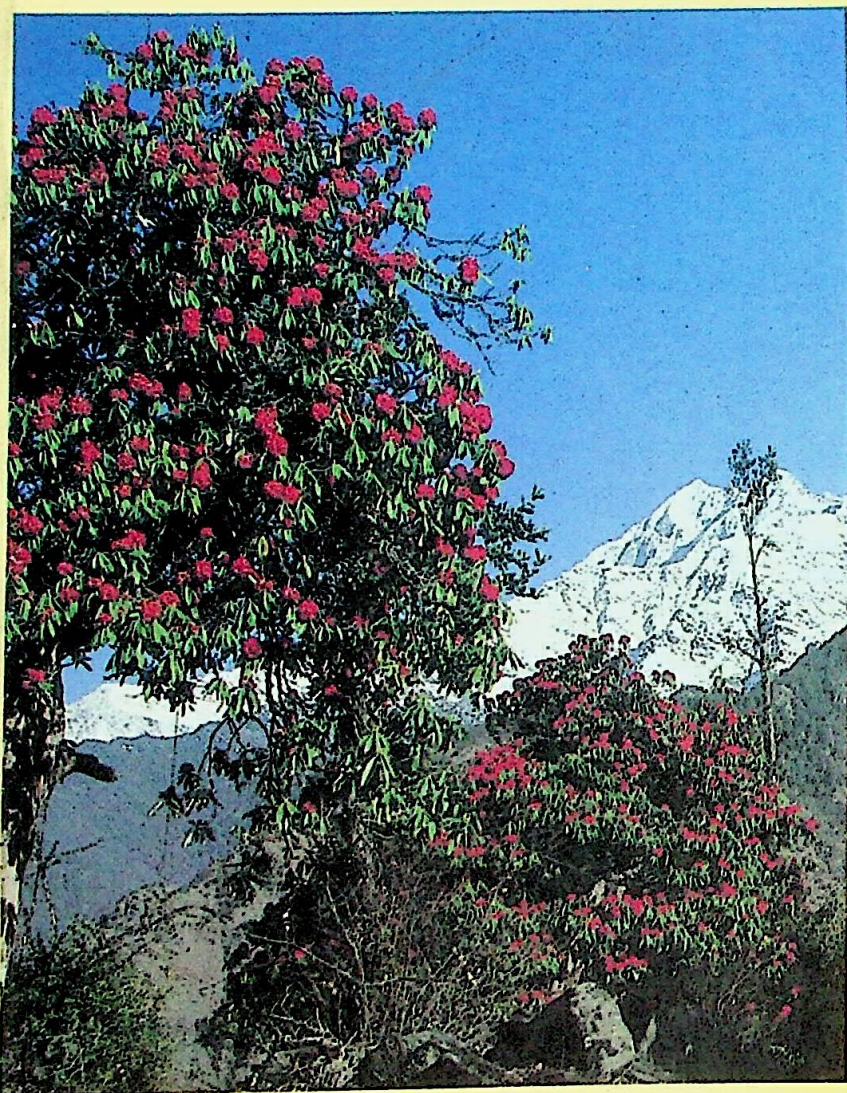


FLOWERS OF THE WESTERN HIMALAYAS



R U P I N D A N G

**FLOWERS OF THE
WESTERN
HIMALAYAS**

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RUPIN DANG



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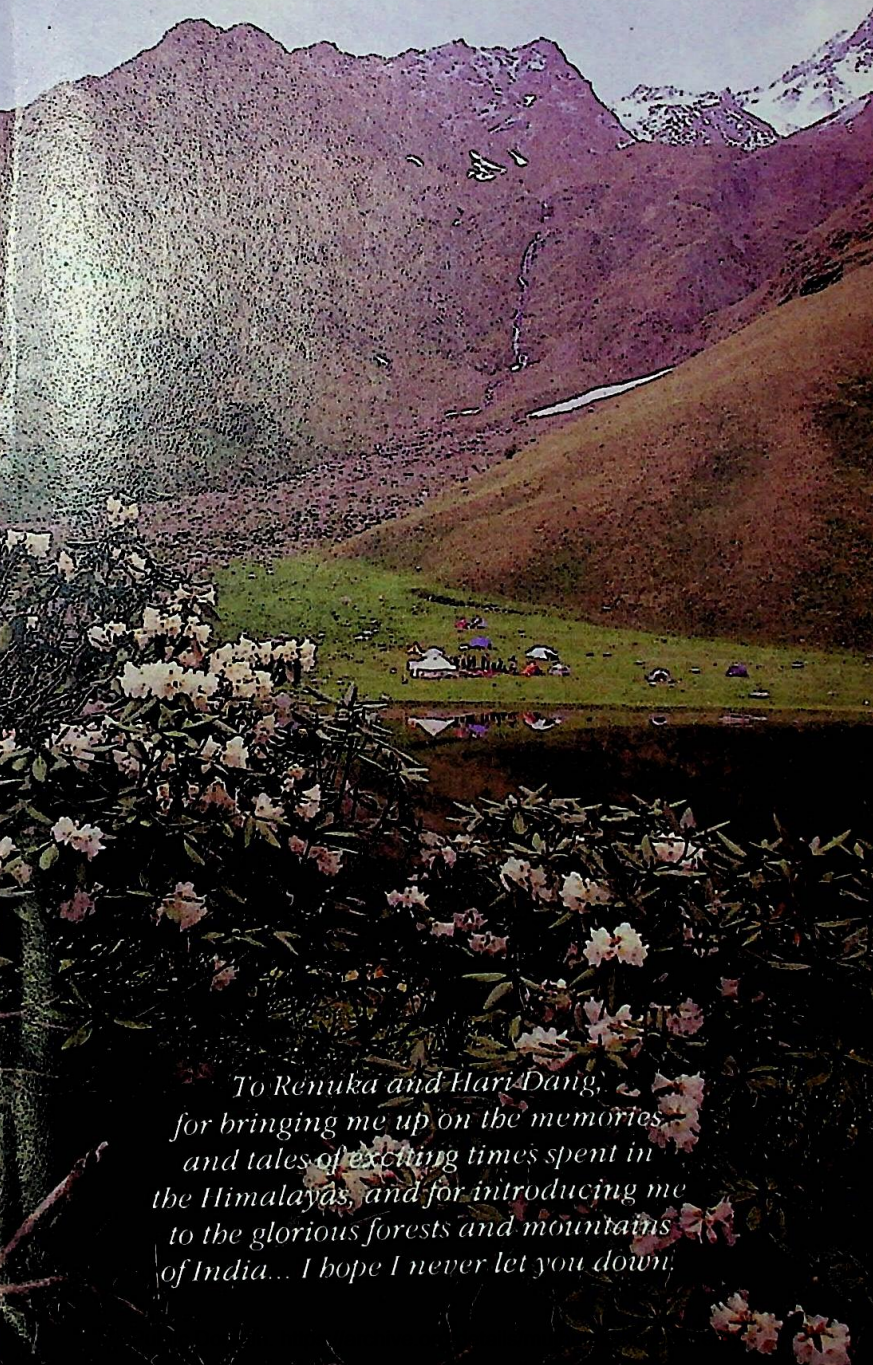
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*To Renuka and Hari Dang,
for bringing me up on the memories
and tales of exciting times spent in
the Himalayas, and for introducing me
to the glorious forests and mountains
of India... I hope I never let you down.*

Acknowledgements

This is not a detailed scientific book on Himalayan flowers; it is supposed to be a field-guide for the novice or the amateur, and it has been written not by a professional, but an advanced amateur. But the work of condensing such a vast topic into a volume of this size can be an exacting task, and I am grateful to several people for their active involvement and assistance throughout the preparation of the manuscript.

I am grateful to Monisha Mukundan, Editor of *Namaste* magazine, for having initially suggested this work and offering valuable advice. I am also grateful to Deepak and Kangan Badhwar and Urvashi Suri for helping me identify some species. A special thanks goes to all my friends, classmates and teachers who have accompanied me on my trips to the mountains and forests, and all those back at school who at first viewed my varied obsessions with growing alarm and then promptly proceeded to join me in these eccentricities.

And not least of all, I must acknowledge my family for constantly bearing up with my hair-brained ideas and projects, spawned twenty by the dozen and the hectic frenzy of activity that invariably accompanies my frequent departures and arrivals, whether from studies abroad or from long trips to the Himalayas and the forests of India.

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Introduction

ABOUT THIS BOOK

For years, there has been need for a concise field guide to the flowering plants of the Himalayas. Some fine publications have been produced, but these are invariably much too detailed and bulky to be taken along into the field.

It is hoped that this volume will serve the purpose of novice naturalists, tourists, mountaineers, trekkers, or plain first-timers to the Indian Himalayas. This book has been restricted to the western part of the Himalayas, as the majority of India's hill-stations, tourist destinations and more common trekking and mountaineering arenas are located in this region. Besides, the flora of the rest of the Himalayas is considerably different from that of the western region, due primarily to the difference in latitude between the western and central parts of the Himalayas. It is difficult to perceive readily, but there is a staggering difference of almost ten degrees of latitude between Kashmir and Nepal. This causes the vegetation to differ quite markedly. Hence, we have confined our range to the Himalayan regions south and east of the southern part of the Indian state of Jammu and Kashmir, running through Himachal Pradesh and into Garhwal and Kumaon in the state of Uttar Pradesh. Even within our area, we have restricted the coverage to the more common hill stations and towns visited by tourists and mountaineers on their way to the high Himalayas. We have covered the frequently-trodden trekking routes as well as the approach marches to the high peaks of each region. Once again, this is a field guide that can comfortably fit into the side pocket of a rucksack. In order to achieve this portability to make this a true field guide, we have had to compromise on a possibly wider coverage of species. In many cases, we have discussed only those flowers that are likely to attract the eye of the average visitor (read non-botanist!) and that are widespread throughout this region. In other cases, we have discussed groups, taking into account only one example which has all the characteristic attributes of that particular group. We feel this would suffice in certain cases where related species can be identified as members of a particular group on the basis of this information.

In the process of compromising on greater detail that would only have led to befuddlement of the complete novice, we have had to make certain generalizations, not only in terms of species and genus

attributes but also exact identification of species in the accompanying photographs. In such cases where we felt exact identification would only have led to confusion, we have restricted the photograph captions merely to the genus name.

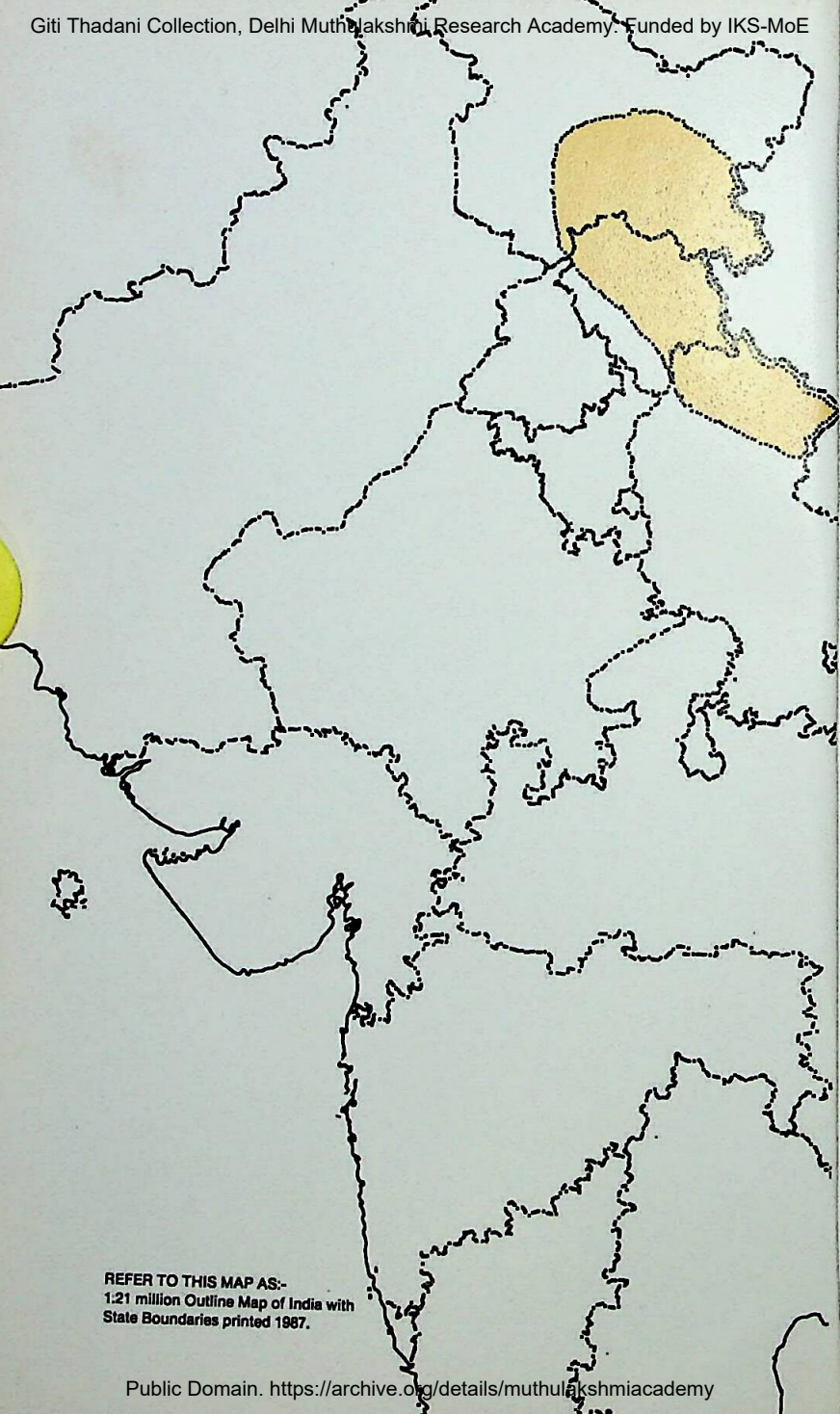
We have also tried to include interesting information about important medicinal plants and their uses in traditional systems of medicine as well as use of plant parts by villagers and local communities.

THE HIMALAYAS: AN OVERVIEW

The Himalayas are 2250km long and stretch from the Nanga Parbat range and the Karakorams where the great Indus is born. From here, the great chain traces a south-easterly direction through Kashmir, Himachal and Uttar Pradesh in India and into the Nepal Himalayas which are about 700km long and on an average, 140km in breadth. Moving through Nepal, the chain of the Himalayas leads into the Indian state of Sikkim and the northern part of West Bengal, with the Bhutan Himalayas being a close neighbour. From here, the Himalayas trace themselves through the northern parts of Assam and right across Arunachal Pradesh at the north-easternmost part of India, where the Brahmaputra river, or the Tsang-Po, enters India.

The parts of the Himalayas that we are taking into account share similar climate and geography and are just under 700km in length and probably less than 125km in breadth at most places.





REFER TO THIS MAP AS:-
1:21 million Outline Map of India with
State Boundaries printed 1987.

Based upon Survey of India Outline Map printed in 1987.

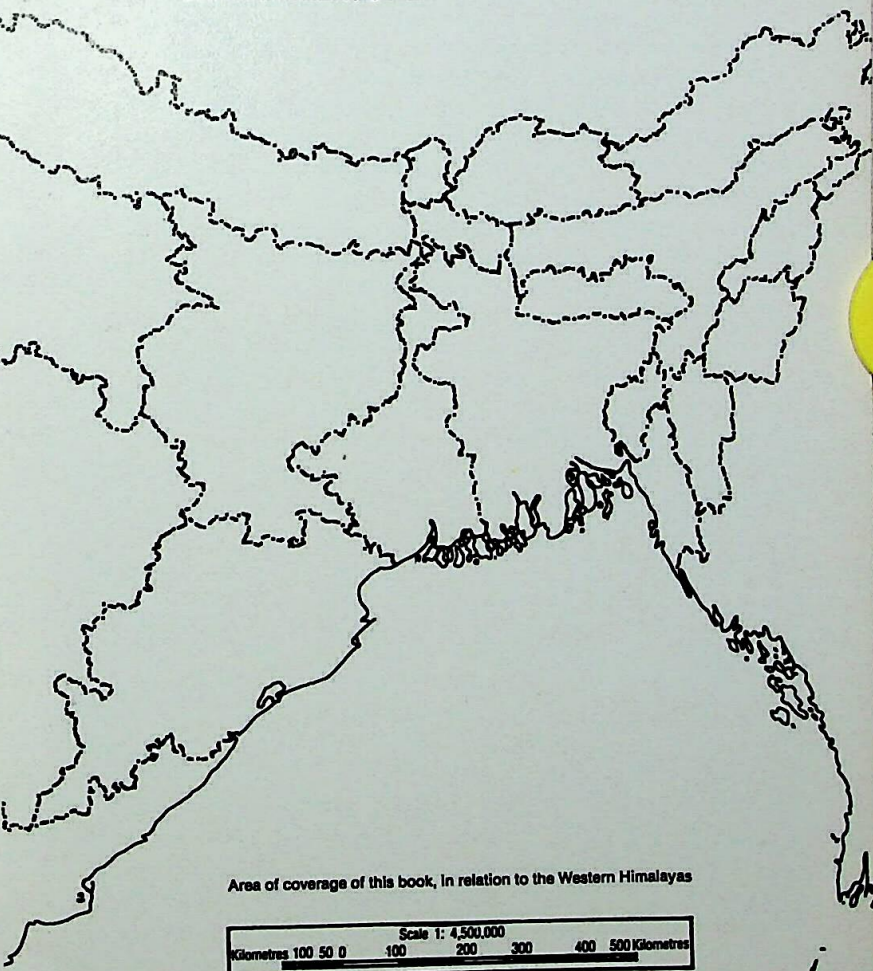
The territorial waters of India extend into sea to a distance of twelve nautical miles measured from the appropriate base line.

The boundary of Meghalaya shown on this map is as interpreted from the North-Eastern Areas (Reorganisation) Act., 1971, but has yet to be verified.

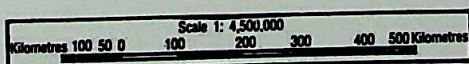
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Area of coverage of this book, in relation to the Western Himalayas



ENVIRONMENTAL FACTORS GOVERNING FLORAL DIVERSITY AND COMPOSITION

The Himalayas harbour one of the richest ranges of floral and faunal diversity in the world. Although no formal figure for the total number of seed-plants exists, the Western Himalayas could well harbour upwards of 7500 species and even this could be a conservative figure. There are a number of exoric species that have made their way to the Himalayas and established themselves there, at places even outcompeting indigenous species. There are several plants that would essentially be classed as belonging to the plains but which have been consistently increasing their ranges to include areas of increasing altitude in the foothills of the Himalayas.

When talking of the Himalayas, we must also give consideration to the several subsidiary ranges that lie between the 'Himalayas proper' and the plains. For example, when travelling to the foothill town of Mussoorie, through the town of Dehra Dun, we are not really traversing Himalayan foothills, but crossing the range of the Shiwaliks, which stretch westwards into Himachal Pradesh and eastwards through the Rajaji and Corbett National Parks. We must also consider the Terai region which stretches along with the Himalayan foothills all the way east through Nepal and is replaced by the Bhabar in the far east. Here the vegetation is vastly different from the Himalayas, as the forests are dense and tropical in nature, and there is a lot of moisture.

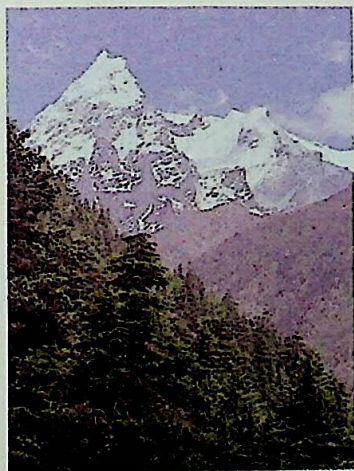


The Himalayas are not only the tallest mountain range in the world, but also perhaps one of the youngest. This is an important reason for encountering the diversity of species that we find here. Although fossil records from across the Himalayas suggest that several million years ago the land was situated below the ocean, the Himalayas have never experienced inundation after their creation unlike most other areas on the earth. Apart from glaciation on a smaller scale on the snow peaks themselves, there is no evidence of the mass-scale influence of continental glaciation on the entire range, at least not in

the last several million years. The lack of disturbance has enabled speciation to occur, while at the same time allowing the older species to survive. This has furthered the species diversity found here, not only of plant forms, but also of birds, animals, and insects.

The extreme diversity in the number of species of Himalayan flora may be attributed to several other factors, such as altitude, which is by far one of the most influential in terms of the composition of Himalayan flora and a basic reason of its diversity. In no other place on earth, though perhaps on a slightly smaller scale in the Andes of South America, does one experience such a range in altitudes, often within relatively short distances, as in the Himalayas. In several places, the snow peaks rise more than 10,000 vertical feet from the bottom of the valley floor. Such a drastic altitudinal range supports numerous levels of distinct (and on a smaller scale less distinct) biological micro-habitats as a result of the changes in vegetation brought about by the altitudinal difference.

There can be a wide variation in the micro-climates found within any one valley, as one ascends to higher altitudes. It is also possible to experience climatic changes between two locations at the same altitude and within the same valley, just a short distance apart and varying only in aspect (the direction that the slope faces). This could be caused by the effects of mountain breezes coming down from the

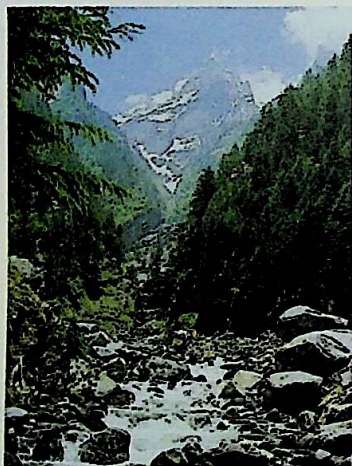


snows which are capable of heavily influencing the vegetation on slopes that are prone to these breezes. On the other hand, sheltered caves and some south-facing locations could be completely devoid of the influence of mountain breezes and harbour an entirely different selection of plant species. Yet another contributing factor could be that north-facing slopes are snowed-over for a longer period each year as they are exposed to less sunshine each day. This would enable only the more

hardy species to frequent these faces, while the south-facing slopes are exposed to greater lengths of sunshine and can harbour less hardy plant forms or plants from lower altitudes. Hence, it is possible within a few hours' trek to cross over from one side of a mountain to the other, and in the process encounter a vastly different vegetation cover.

In our part of the Western Himalayas, the subtropical zone is neither very conspicuous nor extensive in nature and the flora is somewhat limited in terms of diversity and within it, the distance between two places plays only a minor role in species diversity. This zone extends from the Terai belt essentially at a few hundred metres above sea level, to about 1200m in the Himalayan foothills.

The temperate zone lies altitudinally adjacent to the subtropical zone and this extends all the way from about 1200m to the tree-line which in the Western Himalayas, generally ranges between 3500 and 3700m in altitude. Once again, there is a wide variation in the types of climates and corresponding habitats and micro-habitats found within this range. This altitudinal range never presents itself within any one valley in the Himalayas, as the Himalayan range



consists of a series of smaller and parallel ranges rising steadily in altitude and leading up to the highest ranges of the 'Greater Himalayas', which in our area lie more to the north and close to the border with Tibet which slopes off as a high altitude plateau.

However, a similar altitudinal difference may be experienced commonly in the higher ranges; for example, starting from about 3000m at the valley floor and rising to 6000m or more at the summits of the snow peaks.

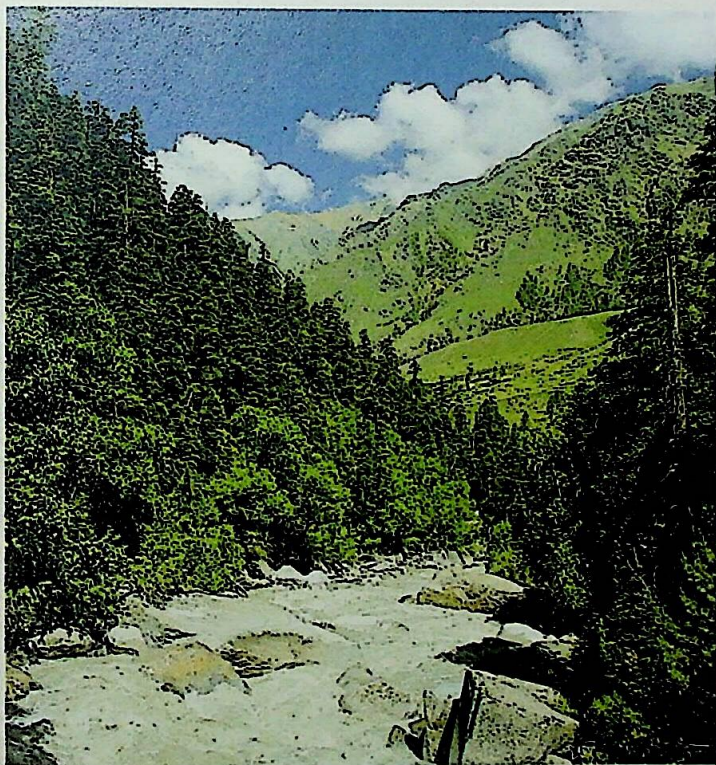
As we ascend the thick forests of conifers and broad-leaf trees commonly growing in the valley floors and by the rivers, upwards of 1200m and often to about 3000m, the tree-cover changes, giving way to thick shrub cover and more compact and smaller shrubs and trees. The lower forests are commonly composed of several varieties of hard and soft woods, but are dominated by several evergreen species such as Oak, *Rhododendron arboreum* and conifers such as Pine and Deodar. Moving higher up these valleys and into the inner ranges, the evergreen forests of Oak and conifers are replaced by different varieties of high-altitude conifers and towards the threshold of the tree-line by forests of Birch, known as *Bhoj* in Sanskrit, the bark of which, known as *Bhoj Patra*, has been used in India from time immemorial to record ancient scriptures and religious works.

The shrubs throughout the tree-line range and higher up are especially interesting in nature. They are dominated by shrub

varieties of *Rhododendron* and *Juniper*.

Once the tree-line is reached, only shrublets and small grasses, sedges and alpine plants survive within the alpine meadows and pasture lands. Here, once again, there is amazing diversity. Above the alpine meadow region, however, the alpine zone extends to the permanent summer snow-line which harbours its own limited range of species that are hardy and adaptable to extremes of temperature, especially cold; and also extreme desiccation during the periods of permanent snow cover, which could range from two or three to almost ten months a year and even throughout the year, but here plants would not be able to survive.

Precipitation plays an equally important role in governing the diversity of floral species and composition in the Himalayas. Most of the precipitation is received during the late summer months and the early winter. The late summer period of rainfall, known as the monsoon, primarily reaches the Himalayas through the south-western monsoon via the Bay of Bengal and to a lesser extent from the Arabian Sea. The monsoon rains usually reach our part of the



Tons valley of Garhwal

Western Himalayas in early to middle-July and recede only in early September.

The effect of the monsoon rains depends on an area's location. The Himalayas act as a barrier and prevent the monsoon from having any effect on trans-Himalayan regions to the north, such as Tibet. Less protected regions such as Garhwal and Kumaon receive abundant rains during the monsoon months, but the effect decreases as one moves north through north-western Himachal Pradesh and towards Kashmir, the latter being protected by the Pir Panjal range which lies directly in the course of the south-western monsoon arriving from the Bay of Bengal.

This difference in the receipt of monsoon rains can also be a local phenomenon created by geographical barriers. An example of this would be the high receipt of annual rainfall in the Tons valley of



Garhwal. Parts of Himachal Pradesh, only slightly to the north of the Tons valley, such as Sangla and Baspa, experience only a third of the annual rainfall received in the Tons watershed. This may be attributed to the presence of several high mountain ranges, such as those of Swargarohini and Banderpunch, all exceeding 6000m in altitude, that lie at the head of the Tons valley and block the advancement of monsoon clouds to the regions in the north, which thus experience a local rain shadow effect.

However, the monsoons are not the only major source of precipitation in the Himalayas, unlike in the plains of India where they play a vital role in the renewal of water reservoirs and in the refilling of groundwater reserves. In the Himalayas, a major portion of the annual precipitation is received in the form of winter rain in the lower regions and snowfall in the higher reaches.



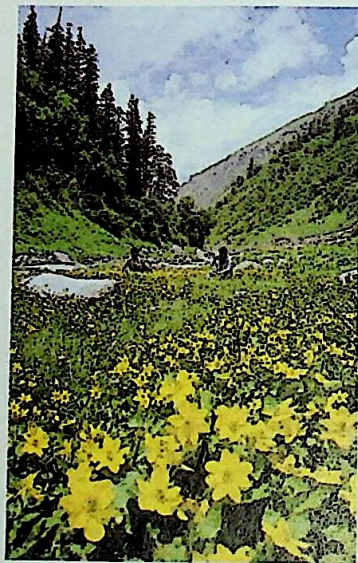
Just about every place in the Himalayas has its own unique flora and there is no place which is altogether devoid of flowering plants. Each season brings out a different aspect of the local flora and there is no one season in which one can see all of a region's plants in flower. The spring season which coincides with the period of snowmelt brings forth a large variety of blooms and these continue into the early summer, although in a somewhat subdued manner. There is a second wave of flowering during the monsoon season in late summer and the protagonists here are quite different from those of the spring. These two occasions would rate as the best times to go flower-hunting to the higher reaches of the Himalayas. However, the lower parts, around the hill-stations and villages are not greatly affected by winter snow and although the flowering of local flora reaches a peak during the spring and monsoons, there are several varieties that only flower in the early or late winter.

There are a few parts of the high Himalayas that can be travelled through by vehicle and these are mostly in Kashmir and its border with Himachal Pradesh. For seeing the alpine flora of the higher non-motorable regions, it is necessary to take to trekking routes that lead up to the meadows and high valleys, either on foot or to a limited extent, on ponyback.

The lower valleys, however, are richly connected by roads, especially around hill stations and important hill towns. The best way to see the flora of these areas would also be to hike, but it is possible to launch fairly ambitious flower-hunting expeditions in the luxury of a car.

But wherever you go, in the course of a day's trek anywhere in the Himalayas, it is possible to encounter a wide range of habitats, each with a widely differing floral wealth. Herein lies the charm of trekking and flower hunting in the Himalayas.





Caltha palustris* var. *himalensis

Marsh Marigold

2600-3800m. May-Aug.

A widespread perennial, commonly seen across the Himalayas on grassy alpine meadows and damp ground beside snowmelt streams. The Marsh Marigold can be easily identified by its large, shining, rounded, and finely-toothed leaves and clusters of bright to pale yellow flowers, 3-4cm. across. The fruit consists of a small cluster of beaked follicles.



Paraquilegia microphylla

3500-4700m. Jun-Aug.

An inhabitant of rock crevices throughout the higher reaches of the Himalayas, this small and distinctive perennial, often to be seen growing in large clusters, bears solitary flowers with petals that range in colour from white to lilac and measure 2-3cm. The leaves are long-stalked, with leaflets that are divided into deeply-lobed segments.



***Aquilegia fragrans* White Columbine**

2500-3500m. Jun.-Aug.

Found throughout our area, and especially common in Himachal Pradesh, this plant is frequently seen growing in forest undergrowth and at the edges of meadows. It is easily identified by the 3-5cm. long cream-coloured and sweet-scented flowers which have long spurs.



Aquilegia pubiflora

Columbine

2400-3200m. Jun.-Aug.

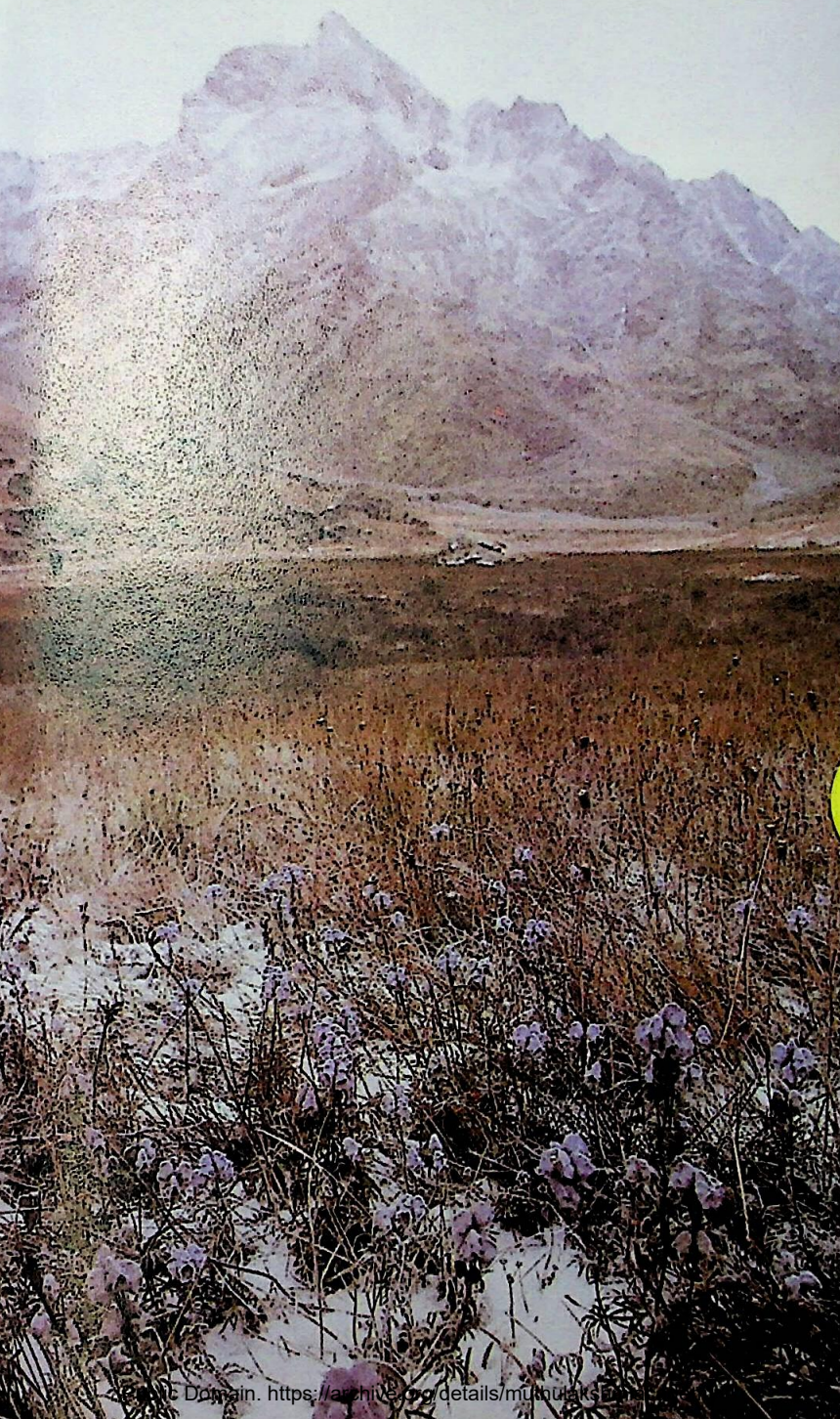
This common plant can be seen in thick forest shrubberies and open slopes alike. Like *A. fragrans*, the flowers which generally grow in isolation and are purple in colour, have short spurs that extend behind the inner rounded petals that are enclosed by the outer pointed petals. The flowers draw attention to the plant in thick roadside shrubberies near hill-stations and along-middle-altitude trekking trails.

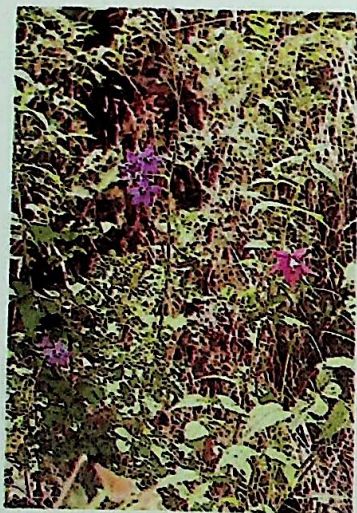
***Aconitum violaceum* Aconite ; Monkshood**

3600-4800m. Jul.-Oct.

A highly variable plant, it may be identified by its dense spikes of many pale or dark blue irregularly-shaped flowers, which measure 2-3cm. across. The plant usually grows gregariously on open slopes and well-watered alpine meadows. The leaves have rounded blades, 5-10cm. across, the lobes being profusely cut into narrow segments, nearly to the base.

A similar species, *A. heterophyllum*, is found at slightly lower altitudes, often in the higher forests. The flowers of this species are greenish-purple and darkly veined. The roots are used in local medicine in Garhwal. Look for these interesting plants in the higher meadows of Himachal Pradesh and Garhwal and Kumaon.





Delphinium denudatum

The Larkspur

3600-4800m. Jul.-Oct.

The most common species of Delphinium to be found in our area, it is very conspicuous on dry grassy slopes and shrubberies and is often seen growing in the company of *A. pubiflora* around our hill towns. This species can be easily identified by its small blue or violet flowers that grow in terminal spike-like clusters. The flower measures about 2.5cm. across and its uppermost petal sports a backward-projecting spur. The leaves have

rounded blades, about 10cm. across and are cut into 3-5 narrow lobes. The roots of most species of Delphinium are used medicinally in parts of Garhwal and Kumaon.

Delphinium vestitum Larkspur ; *Loona*

2400-4000m. Jul.-Oct.

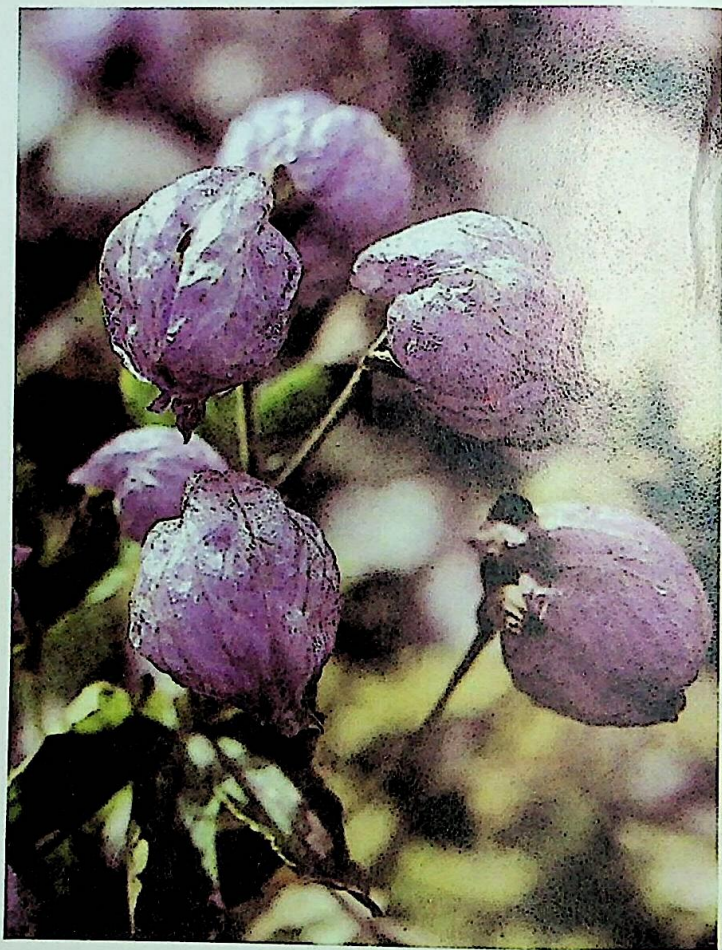
This species replaces the more common *D. denudatum* at the higher altitudes, and is fond of shady ravines and thick shrubberies, often on the north faces of hillsides. It can be readily distinguished by the flowers which are a dull purple or bluish-white, and sport an inflated conical spur.



Delphinium cashmerianum

3000-4500m. Aug.-Sep.

An uncommon high-altitude *Delphinium* found throughout our area and quite prominent in Kashmir and the high ranges of Kumaon and Garhwal. Usually seen growing in thick clusters on alpine slopes and moist ground, the leaves are deeply lobed and measure about 4cm. across. The flowers are usually a bluish-purple with a stout spur and have a hairy texture. The flowers, usually 2-3cm. across, grow in bunches of threes and fours at the ends of the flowering stems.



Delphinium brunonianum

4400-5400m. Jul.-Sep.

This *Delphinium* grows at higher altitudes than any other and is superficially similar in appearance to *D. cashmerianum*, save that being a higher altitude species, it looks hardier, grows to a shorter length and the plant itself is more compact on the whole. However, the flowers look somewhat different in that they are hairy and have conspicuous blue veins running across the petals, a comparatively short and blunt backward-projecting spur on the uppermost petal. The flowers also appear to be puffed-out or inflated in appearance. The plant, which grows on stony slopes and high altitude screes, often exudes a musky odour and it is also used medicinally.



Ranunculus spp . Buttercup

Usually Apr.-Jun., depending on altitude. A large family of many similar looking flowers, with small botanical differences. There are many low-altitude species as well as high altitude ones that frequent the alpine meadows. The flower is always composed of five shining yellow petals.



Anemone polyanthes

2400-4200m. May-Aug.

A common and often gregarious perennial, often extending way above the tree-line. Easily identified by the dense umbel of flowers and the compact leathery leaves. The flower petals usually number four, but frequently number up to seven. The colour of the flowers is variable; usually white from Himachal Pradesh to Kumaon, but frequently red and even mauve further east in Nepal.

While *A. polyanthes* is found throughout our range and further east, a similar plant, *A. tetrasepala* has a more limited range westward of Himachal Pradesh. This species is found at lower altitudes and the flowers are only white in colour.

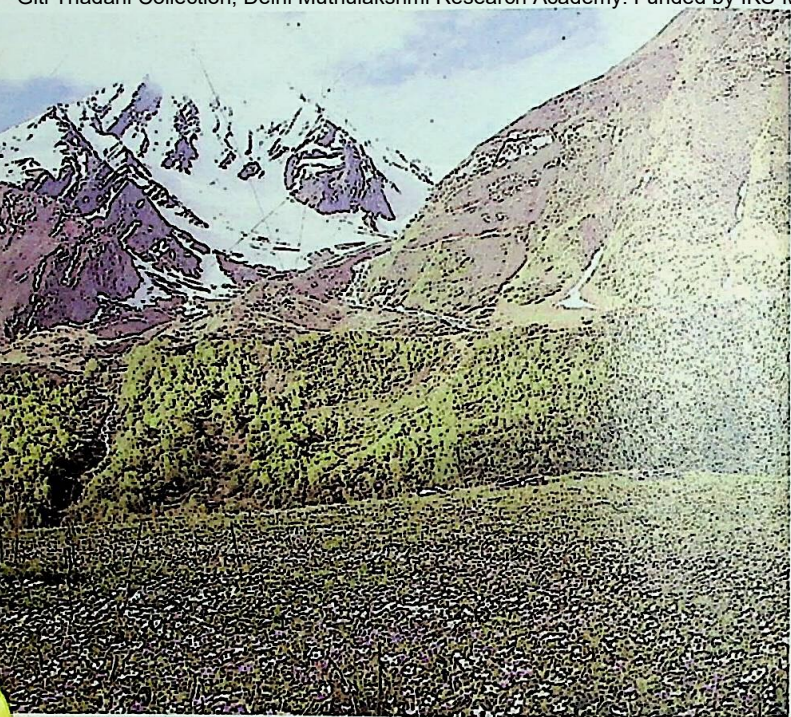


Paeonia emodi Himalayan Peony
1800-2500m. Apr.-Jun.

A tall, almost shrubby plant that attracts attention by way of its large snowy white or pinkish flowers with deep yellow stamens and large deeply-cut leaves. The flowers measure about 8-10cm. across and commonly have from 6 to 10 petals. The leaves measure from 25cm. to a maximum of 70cm., and are divided into several long and pointed leaflets. A fairly common plant seen in roadside shrubberies and along forest

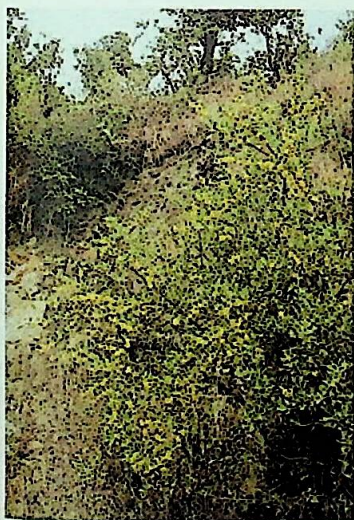
trails throughout UP and Himachal Pradesh, all parts of the plant, from the tubers and the roots to the seeds and the flowers are used in local medicinal preparations.





Anemone obtusiloba
2400-4200m. May-Jul.

A perennial, widespread and gregarious herb with flowers that measure 2-5cm. across and range in colour from white to deep blue and in the higher reaches of Kashmir attain a rich buttercup-yellow. Commonly to be seen on meadows, grazing grounds and beside mountain trails, one is likely to encounter this *Anemone* on any of the high-altitude treks within our region, during the summer months. While the flowers most often have five petals, the leaves are deeply 3-lobed and further divided into segments, their edges being heavily toothed.

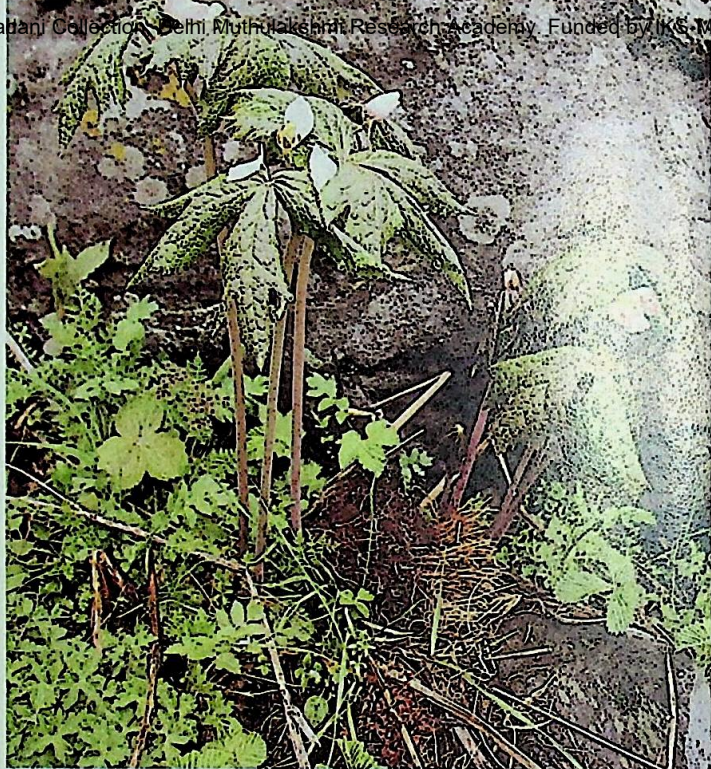


Berberis aristata Barberry;
Kashmal, Kingora, Kishmoi
1800-3200m. Apr.-Jul.

A medium-sized shrub, growing to about 2m., widely branched and with clusters of yellow flowers. A common plant in shrubberies around hill-stations and in the lower hills throughout our area. The species is distinctive in having yellow branches and elliptic spineless leaves and stems.

A similar plant, *B. ceratophylla* differs from *B. aristata* in having conspicuously yellow-grey bark and 5-10cm.

long stem spines as well as spiny wedge-shaped leaves. The fruit of both is a dark red or purple. An extract from the wood and bark is used medicinally, in ayurvedic and other tonics such as LIV. 52.



Podophyllum hexandrum

Himalayan Mayapple ; *Rikhperta*,
Papra, *Bankakari*.

2400-4200m. May-Aug.

A mostly solitary-growing herbaceous plant found at high altitudes throughout our range, it grows on open slopes or on moist ground in protected ravines. The solitary white or pale pink terminal flower is borne at the end of a 15-25cm. long unbranched stem and is protected by two or three large-lobed leaves. The flower is a delicate cup-shaped structure and is short-lived, the petals and sepals falling off within about two days of flowering. It can be found throughout the higher meadows of our area. While the importance of this plant for medical uses has been recognized by traditional medicinal practices of the Garhwalis and Kumaonis from ancient times, recent scientific investigations have revealed that the rhizome which contains podophyllin could make the plant an effective drug in the treatment of cancer. The seeds of the ripe fruit are separated and the pulp is consumed to cure altitude sickness.



Meconopsis aculeata Himalayan

Blue Poppy

3000-4000m. Jul.-Aug.

One of the most characteristic elements of Himalayan flora, the Himalayan Blue Poppy is surely one of the most omnipresent and pleasing sights that an alpine meadow in full bloom during the monsoon season has to offer. A widespread species, it is found throughout the Western Himalayas. The flowers are few, usually no more than three or four and coloured a brilliant blue which could sometimes be tinged with purple or rose. Occasionally,

pure white or cream-coloured forms may be seen, at higher altitudes or in the eastern parts of our area, mostly in Garhwal. The flower is composed of four prominent and somewhat rounded petals, while the leaves are deeply-lobed and bristly-haired. The stem grows to about 50cm. and is uniformly covered with bristly hairs.



Corydalis spp.

Approx. 2800-4200m. Jul.-Aug.

A large group of plants, belonging to the Poppy family. The plants frequent rocky slopes and screes at fairly high altitudes and are characterized by irregular flowers, which are distinctly two-lipped, the upper petal being hooded and the lower somewhat cup-like in shape. The general appearance of all the species is similar, although the flowers may differ in colour.

C. rutifolia is found at somewhat lower altitudes throughout our range and can be identified by its small pink or purple flowers growing in a dense terminal cluster.

C. govaniana is found at higher altitudes and is generally well-distributed and fairly common on alpine screes and sandy soils. The yellow flowers grow in dense terminal clusters up to 10cm. long. The leaves are distinctive in being heavily dissected, while the rootstock is commonly covered by old dead leaves that form a sort of base. The roots are used medicinally.

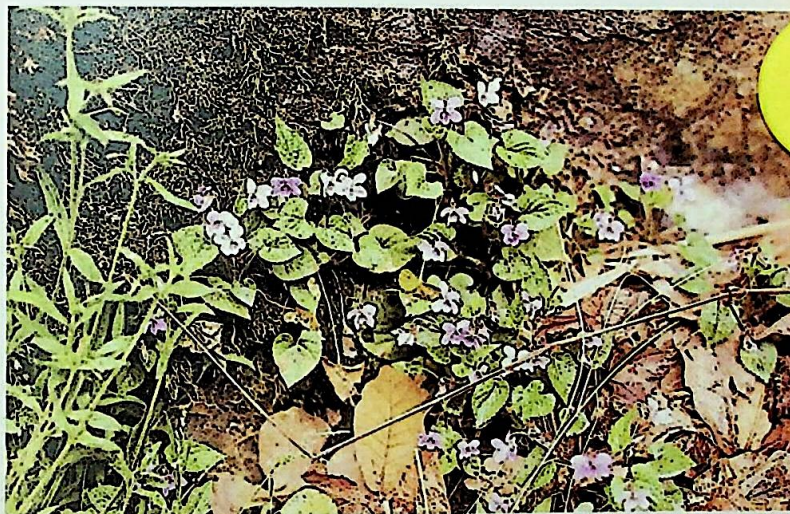
C. cashmeriana is a small plant with attractive blue flowers growing in terminal clusters. It is fairly abundant on screes and open slopes, at altitudes between 3000-4500m. through most of our area.



Viola biflora Yellow Violet

2500-4500m. May-Jul.

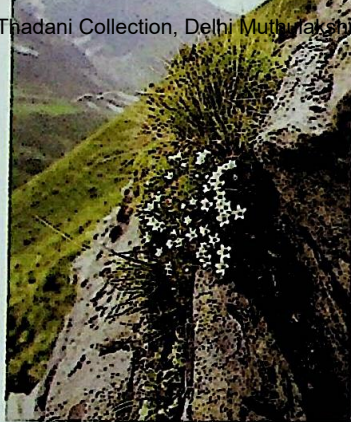
A fairly common herbaceous perennial which bears usually solitary yellow flowers, that can be identified immediately by their close resemblance to the domestic Violet seen in city gardens. The flower, coloured a bright yellow with narrow dark-brown veins radiating from the centre, may be seen growing in small clusters on open slopes and in light lower alpine shrubberies. Measuring about 1.5-2cm. across, the flower has five unequal petals, the lowest one being the largest, with a short sac-like spur at its base.



Viola canescens Violet

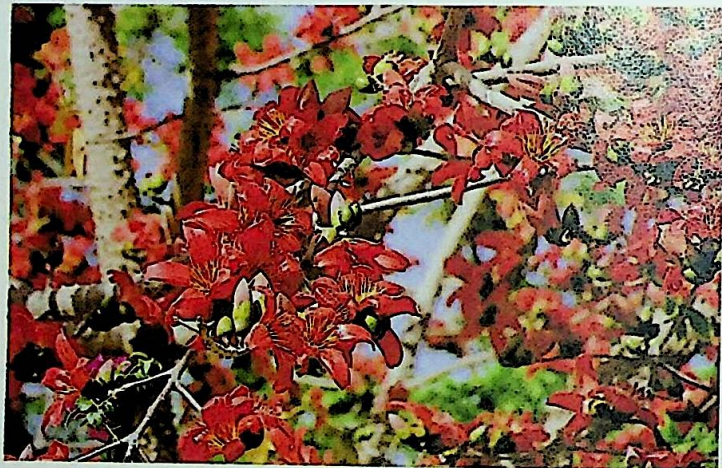
1500-2400m. Mar.-Jun.

A low-altitude and more common version of the previous Violet, being found throughout our area, in thick shrubberies and grassy slopes, beside footpaths and between the exposed roots of shrubs. The leaves are minutely hairy, while the blooms range from violet to whitish in colour and grow solitary or in small clusters.



***Arenaria spp.* Sandwort**

A large family of herbaceous annuals or perennials, usually small compact cushiony plants that grow at high altitudes with flowers growing in thick complex clusters. The leaves are usually grass-like and thin, while the flowers are generally white and very tiny, growing in flat-topped clusters.



Bombax ceiba* Silk-Cotton Tree; *Semal

Up to 1500m. Feb.-Apr.

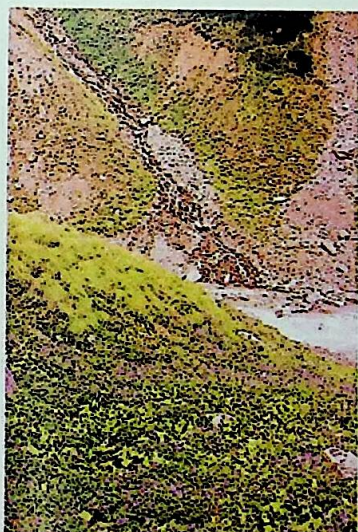
A tall distinctive deciduous tree with flamboyant blossoms during the spring, when the ends of the bare boughs are adorned with clusters of large scarlet flowers, almost artificial in their waxy texture and perfect shape. The trunk of the tree is buttressed when old, but covered with conical spines when young. The seeds are embedded in a thick cushion of white cottony hairs. A common sub-Himalayan species, which ascends many of the river valleys to inner hill stations and towns, such as Uttarkashi in Garhwal, but generally found in the outer ranges. The flower calyxes are eaten as a vegetable, cotton from the ripe seed pods is used to stuff pillows and mattresses and the seeds make a nourishing food for cattle, while an extract from the roots of saplings are used as a nervine tonic in traditional medical practice.



Geranium wallichianum Ratijari

2400-3400m. Jun.-Sep.

Commonly found in forest and roadside shrubbery throughout the lower hills in our area, the leaves are divided like those in a palm, while the flowers are usually rose to purple in colour, with a pale centre and darker purple lines on the petals. The flowers grow singly or in pairs. The roots are used to cure headaches and rheumatic pains.

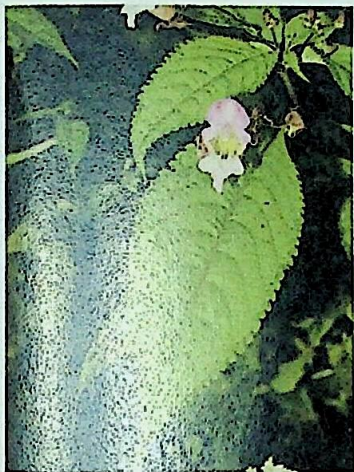


Geranium pratense Meadow
Cranesbill

3000-4400m. Jun.-Aug.

A high altitude variety of the previous species, this one is found on moist ground, usually beside snow-melt streams and permanent water courses in the high meadows throughout our area. The flowers characteristically grow in pairs. The flower is a bluish-purple, with darker veins running along the petals.





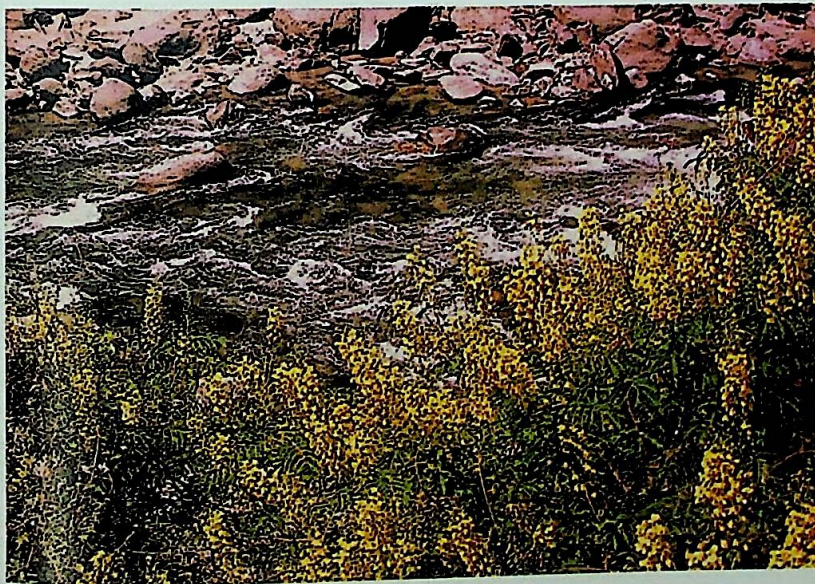
Impatiens spp. Balsam

One of the more difficult genus with numerous species differing by small botanical characters and differences in range, plants may otherwise be attributed to this genus by the characteristic bloom. As a rule, they are fond of wet soil beside streams and in damp forests. The fruit is a characteristic explosive capsule with valves that coil up and throw out the seeds when ripe. Commonly found at low altitudes in the foothills and around hill-stations.

Caesalpinia decapetala Mysore-Thorn ; Alai, Karanj

Up to 2000m. Mar.-Jun.

A large prickly climber which may be commonly seen among thick shrubberies on moist ground by river banks and in ravines. It can be easily identified by the erect-growing spiky clusters of bright yellow flowers, which can measure up to 40cm. long. The bark being astringent is sometimes used for tanning.





Cassia fistula Indian Laburnum ; *Amaltash*

Up to 1500m. Apr.-Jun.

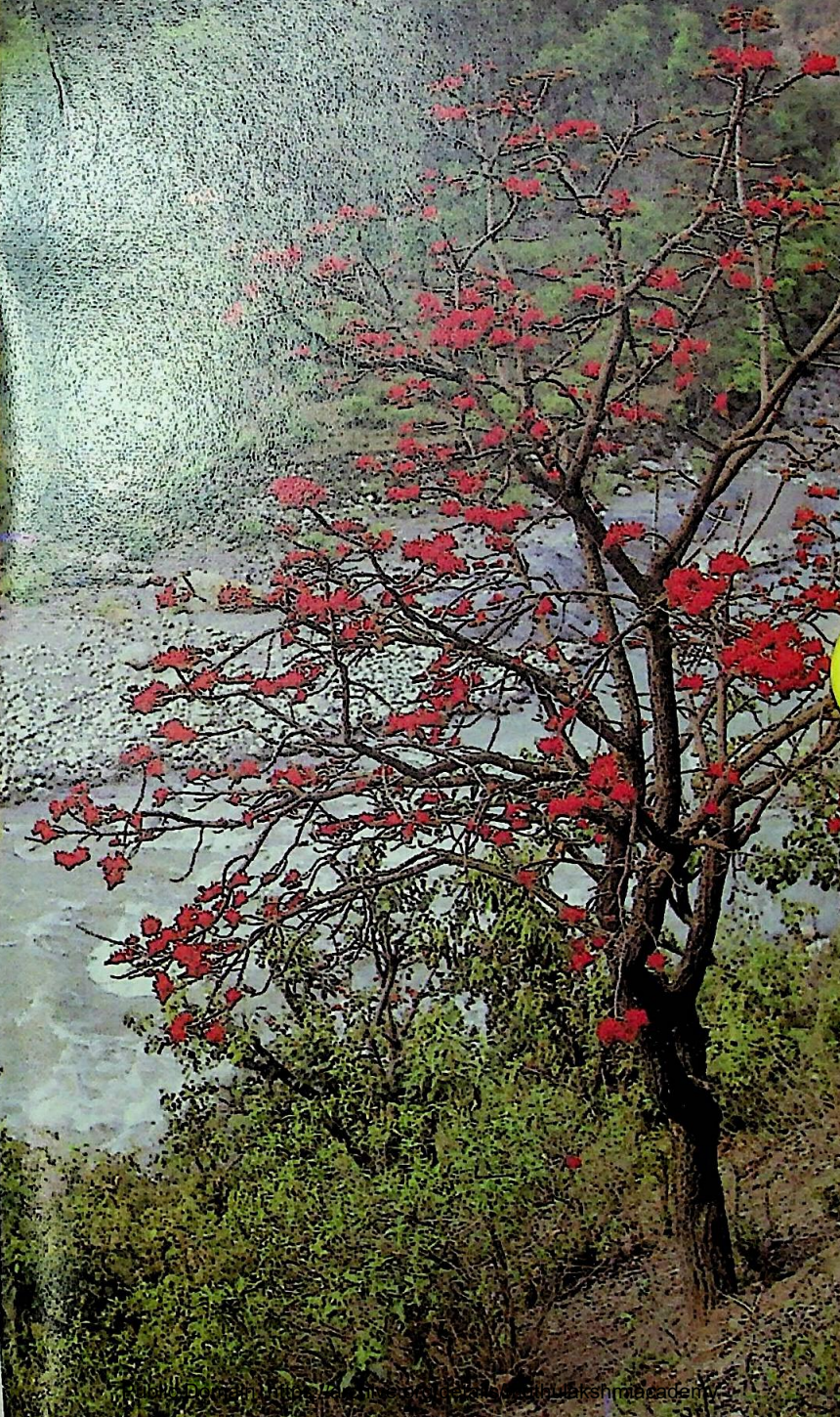
This common and widely distributed tree of the Indian plains is often seen in Himalayan foothill forests and around Shiwalik towns, in Himachal and UP. A moderate-sized evergreen tree, with greenish bark, bright yellow flowers borne in pendulous clusters and long (up to 60cm.) glossy-black seed pods. The wood is very durable and is used for implements, the dark-brown sweetish pulp of the ripe fruit is a purgative and is used to spice locally-manufactured chewing tobacco and the bark is used for tanning and dyeing.

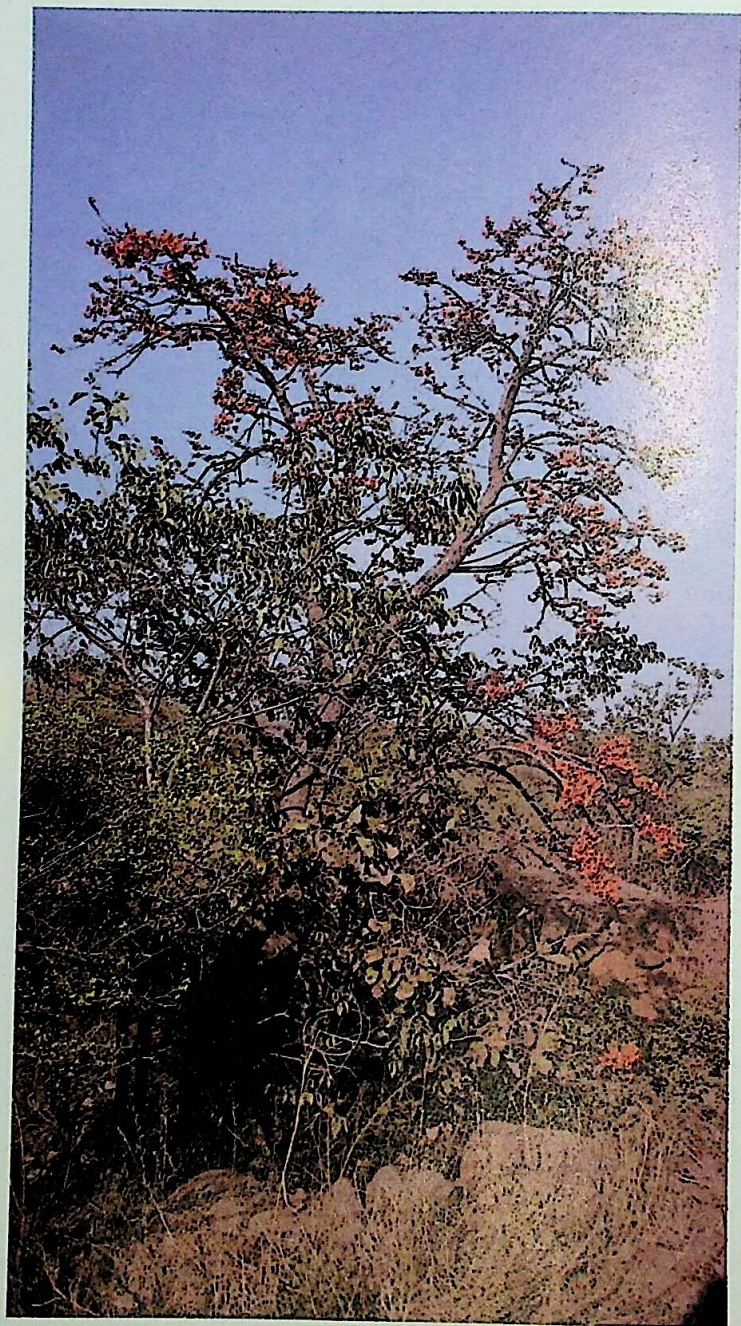
Erythrina suberosa Coral Tree

800-1300m. Mar.-May

A moderate-sized deciduous tree immediately identifiable by the bright scarlet flowers growing in small crowded clusters at the ends of the branches, and even before the appearance of the leaves, giving the tree quite a striking appearance. The tree's bark is corky, light-grey in colour and marked with deep fissures. The wood is soft and spongy, but being fibrous, it is used to make handles for small implements. The tree is easily propagated by cuttings.



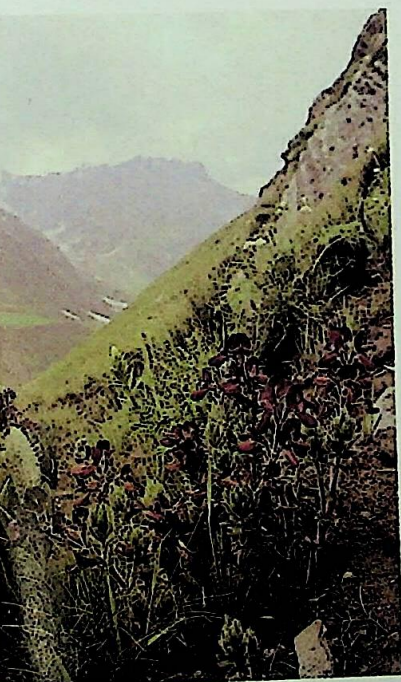




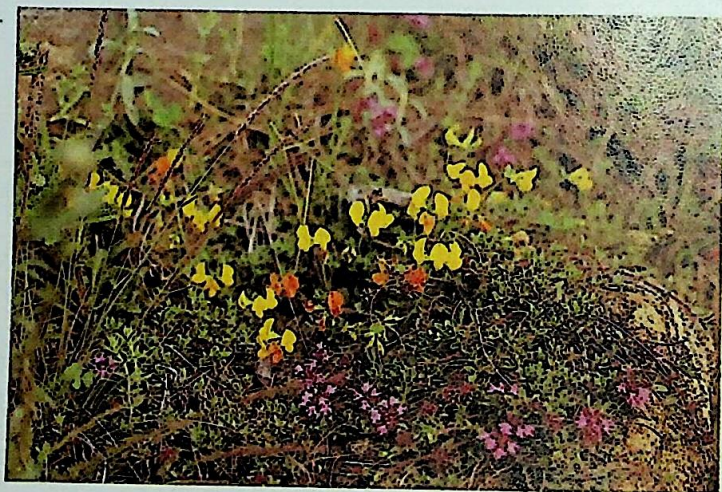


Butea monosperma Flame of the Forest ; *Dhak, Palas, Tesu*
Up to 1200 Feb.-May
 A moderate-sized deciduous tree, growing up to about 15m. in the Himalayan and Shiwalik foothills. The tree is unmistakable at any time of the year; when in flower, the brilliant orange blossoms paint the lower forests and when not in flower, the large and distinctly-shaped trifoliate leaves assure easy identification. The dirty-white-coloured bark exudes a red juice that is used as a gum while the leaves are heavily-

lopped for animal fodder and are used for making *daunas* or leaf-cups for serving food and for religious offerings. The flowers yield an orange dye which is traditionally used as a colour for the *Holi* festival which coincides with the flowering season.



Thermopsis barbata Black Pea
3200-4500m. May-Jul.
 Found in the northern parts of Himachal Pradesh and Garhwal, this is a plant of open slopes and high meadows. Easily identified by its terminal cluster of purple to chocolate-brown flowers, which look in some ways like those of the domestic pea, and the leaves which comprise three hairy leaflets.



Lotus corniculatus Common Bird's Foot Trefoil
1800-4000m. May-Sep.

A common but highly variable perennial, usually growing prostrate on open slopes or near high-altitude cultivation. The leaves are distinctly divided into five leaflets, while the flowers are usually yellow but tend towards orange even within the same plant. Found throughout our range, in a variety of soils and conditions.

Rubus spp. Raspberry

The familiar Raspberry is met with frequently in the foothills. Distinguished by its fleshy fruit of several smaller carpels, all the species are shrubs, usually with spines. There are a number of similar species, with fruit that ranges in colour from yellow and orange to scarlet and black.

Rosa spp. Rose

There are a number of introduced species of Rose in the Himalayas, with a few endemic ones which are commonly seen around hill-towns in the Western Himalayas. The flowers are unmistakably rose-like, but exact identification can sometimes be confused with related species. The fruit, however, is distinctive, being a fleshy flask-like structure.

R. webbiana is a common shrub rose, widely distributed throughout our area, and growing from about 1500m all the way to 4000m. in parts of Himachal Pradesh and Kashmir. Flowering from June to August, it is common around hill villages, where its clusters of pink flowers make it a pleasing sight. Sometimes it is difficult to tell from *R. macrophylla*, but by and large this is a larger shrub, with more profuse blossoms that grow in denser clusters.



R. Macrophylla has pink flowers and grows as a thick shrub at altitudes ranging from 2400 to 3600m. and is found in shrubberies, often at the outskirts of villages. The shrub grows up to 5m. high, and has purplish stems. The leaves are large and have 5-10 smaller leaflets which are finely toothed and hairy. Flowering takes place in June and July.





Cotoneaster microphyllus

Bhedda

2200-4400m. Apr.-Jun.

A low many-branched prostrate evergreen shrub that forms a mat over large rocks, sending its roots into crevices in the rocks. The small star-shaped axillary white flowers draw attention to this curious shrub. There are several varieties of dwarf prostrate shrubs within our region, but *C. microphyllus* is the most widespread and differences between the species are minute. The leaves are small and elliptic in shape, dark green and glossy

above and are borne on stiff branches. In Kashmir, the branches are often used for making baskets. The ripe fruit which attains a scarlet colour is sweet-tasting and even eaten in some areas.



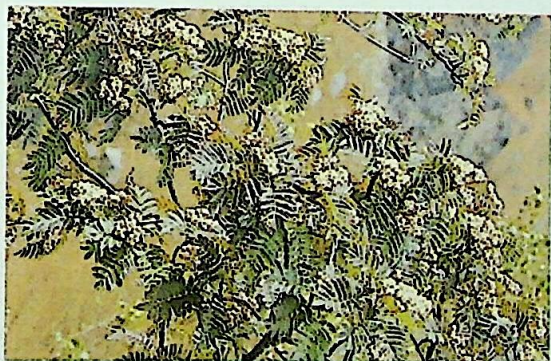


R. Brunonii, the Himalayan Musk Rose, is commonly seen among shrubberies throughout our area, between 1200 and 2500m. A tough climber or small shrub with prickles, and small clusters of fragrant white flowers, about 3-4cm across, and with 5 petals. The leaves have 5-6 elliptic leaflets that are profusely and finely toothed and quite prickly. Flowering takes place between April and June.



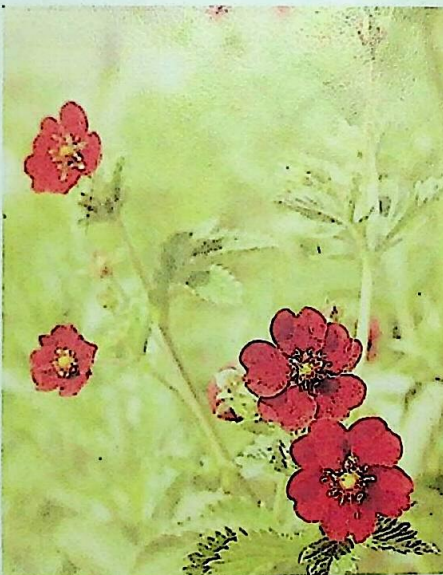
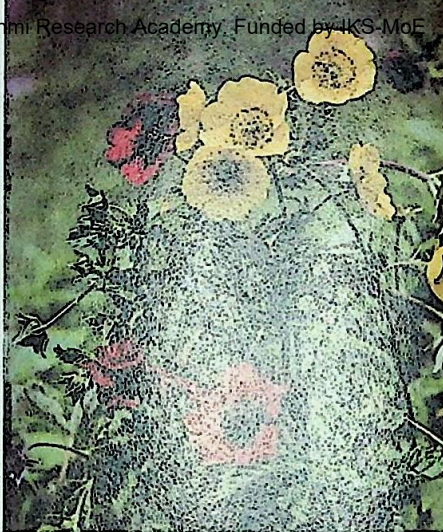
Spiraea canescens Takoi, Chakroi
1500-2800m. May-Jun.

A small stiff shrub characterized by grey arched branches and small, white, creamy or pale pink flowers, growing in dense clusters at the ends of the drooping branches. When flowering, a common sight at the edges of middle-altitude cultivation and in trail-side shrubberies near villages throughout our area, this plant could easily go unnoticed when not in flower.



Sorbus spp.
Approx. 2700-3700m.
Apr.-Jun.

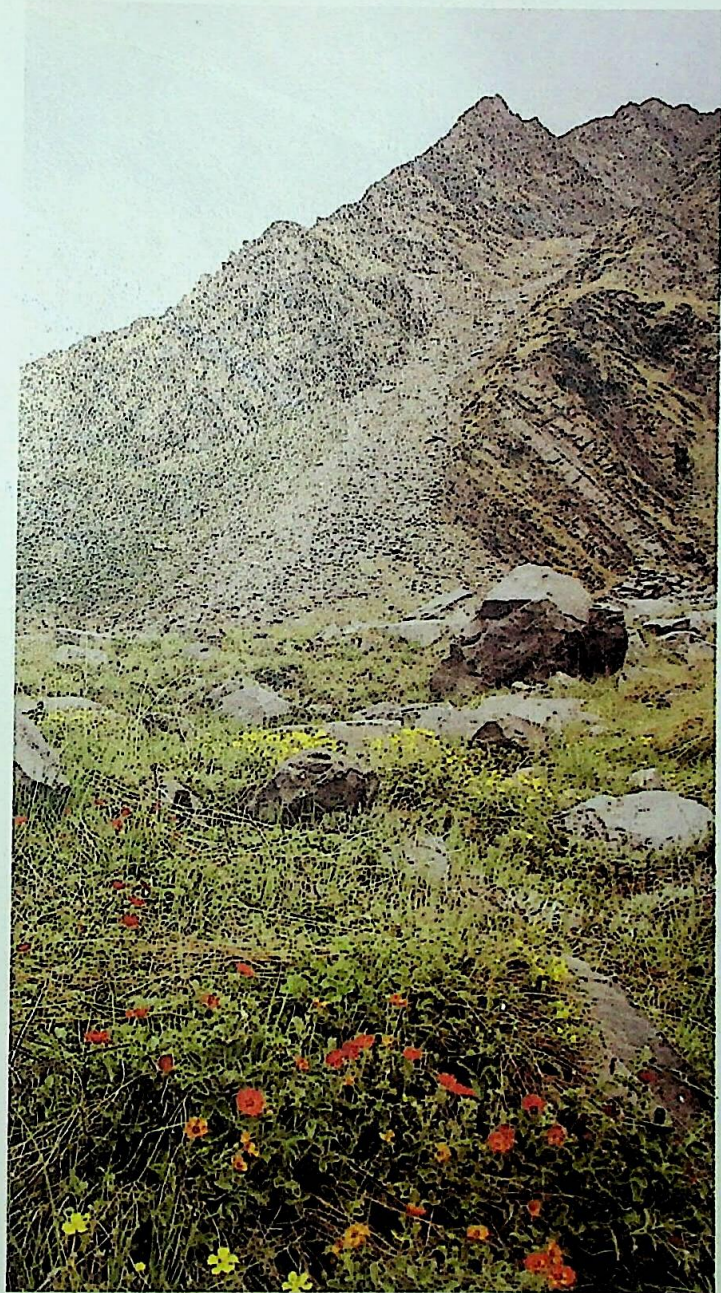
A group of medium to large-size shrubs and small trees, found in alpine shrubberies and the higher levels of the tree line, frequently in association with Birch and *Rhododendron campanulatum*. The flowers generally grow in dense flat-topped clusters, as do the fruits which are often edible.



***Potentilla atosanguinea* Cinquefoil**

2400-4200m. Jun.-Aug.

This very variable perennial bears flowers that range from yellow to orange and wine-red. The trifoliate leaves, which are densely silver-haired and coarsely sharp-toothed set it apart from most other *Potentillas*. The flowers either grow isolated or in small groups. Commonly seen growing on open meadows, in high-altitude shrubberies and on alpine grazing grounds throughout our area.



***Fragaria nubicola* Strawberry**

2000-3600m. Apr.-Jun.

This is the wild ancestor of the cultivated strawberry plant. Commonly seen in forest glens and along trekking trails in April and May (The strawberries of Dodital in Garhwal are famous!). The globular fruit, trifoliate leaves and small white flowers make this plant distinctive. The three leaflets are deeply and coarsely toothed and ribbed, while the red fruit is most often insipid and small, though it may sometimes be large and sweet enough to eat.



***Potentilla cuneata* Cinquefoil**

2600-4200m. Jun.-Sept.

A small spreading perennial, growing on rock or hard ground, easily identifiable by its solitary yellow flowers that are borne on short stems. The small leaves are further divided into three pointed and well-toothed leaflets. This *Potentilla* is more commonly seen in the northern-most portions of Himachal Pradesh and Garhwal.



***Geum elatum* Aven**

2800-4000m. Jun-Aug.

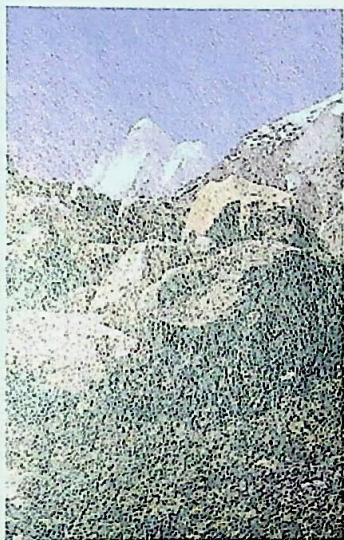
A flower which may at first appear to be similar to *P. atrosanguinea*. However, as the fruit of this plant is quite different, and this difference may not be apparent to the novice, suffice it to say that *Geum* bears a larger number of flowers (often close to a dozen) whereas *P. atrosanguinea* rarely has more than two or three flowers. The leaves are also quite different, the upper ones being narrower and more deeply lobed in *Geum*. The basal leaves are divided into two rows of smaller leaflets along a central spine and the leaflets are profusely toothed in nature. The flowers are variable in colour and though usually a deep yellow in colour, according to range they could also be reddish-orange.





Bergenia ciliata The Wax Flower ; *Pashanbhed, Shilphara*
1800-4000m. Mar.-Jun.

A common resident of shady ravines, rocky ledges and moist well-shaded slopes, this plant may be readily identified by the white, pink or purple flowers that grow in a spreading dense cluster or by the thick, elliptic glossy leaves that hug the ground. While the wide leaves with their bristly margins cling to the ground, the flowers are borne aloft to about 25cm. on a thick leafless pink stem. Curiously, the Sanskrit name, *Pashanbhed*, meaning rock-splitter, corresponds with the meaning of the older Latin generic name *Saxifraga* which has since been renamed *Bergenia*.

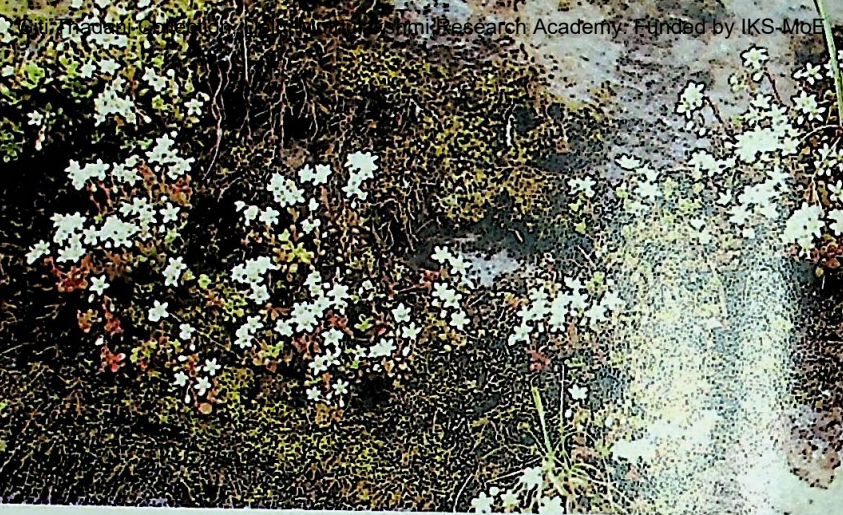


Bergenia stracheyi Wax Flower

3000-4400m. Jun.-Aug.

This species may be distinguished from the last by its altitude range which is generally higher and by the overall appearance of the leaves, which are not only longer but have bristly margins. They also appear to protect the flowering stalk, growing upwards and not hugging the ground. The flowers are pink and are borne in a drooping cluster. This species is generally found in less protected locations such as on rocks and open slopes.





Rosularia rosulata

1500-3000m. May-Jun.

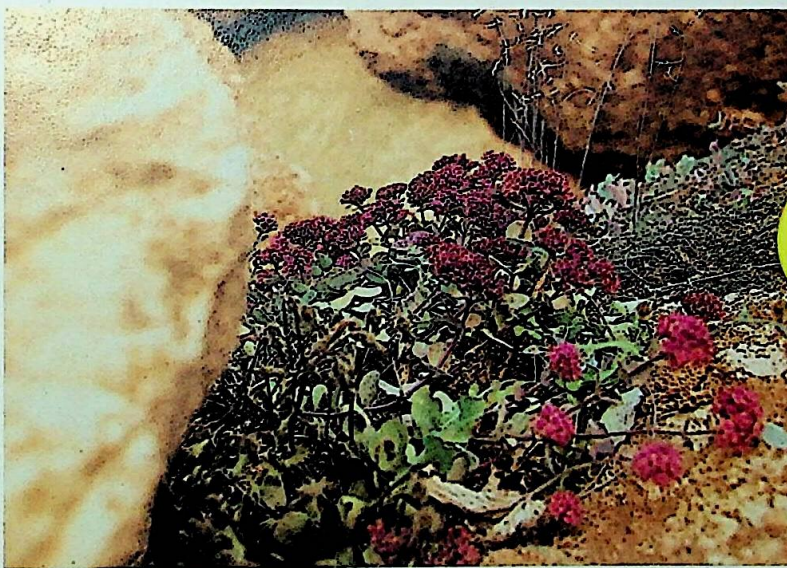
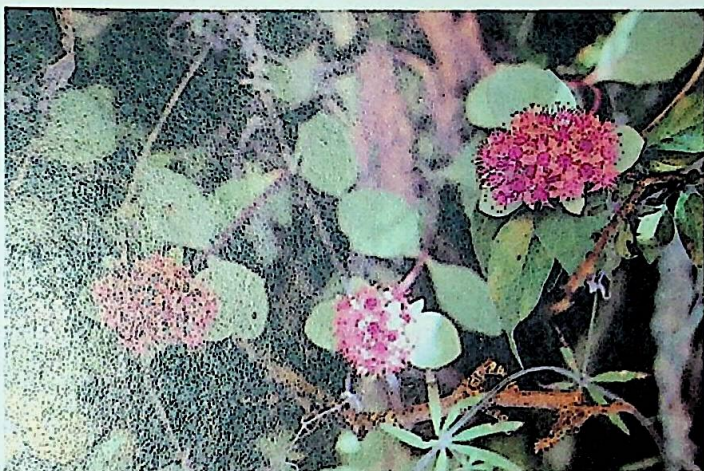
A small plant with succulent green and brown leaves, and tiny terminal clusters of delicate white flowers, each about 5mm. across. Quite commonly seen growing on damp rocks by streams and along forest trails throughout our area.



Rhodiola himalensis

3500-4800m. Jun.-Aug.

A distinctive high-altitude plant of open rocky slopes and alpine shrubberies, the stout leafy stems give rise to dense flat-topped terminal clusters of dark red or light yellow flowers, and succulent leaves.



Sedum ewersii Stonecrop.

2700-4500m. Jul.-Sep.

Distinguished by the dense clusters of delicate pink flowers and the flat fleshy bluish rounded leaves, this plant can be seen growing on stony slopes and well-watered areas, usually by river banks or snow-melt bogs. This plant is quite prominent in the north-eastern parts of Himachal Pradesh such as the Chenab valley, and in western Garhwal, around the Har-ki-dun.

Osbeckia stellata

1200-2500m. Jul.-Oct.

A small-branched shrub, found throughout our lower hills and often seen growing by roadsides and on rocky banks, the flowers are pinkish in colour and have four petals and either grow solitary or in small terminal clusters, the flower being 5-6cm. across. The leaves are distinctive, being long-pointed and with five prominent lightly-coloured veins. The fruit and bud are densely hairy.





Woodfordia fruticosa Dhaula,
Dhattri

300-1500m. Feb.-Jun.

A large shrub with long spreading branches, commonly seen in light foothill forest, and on open slopes. The bright red tubular flowers attract attention and are a common sight on the road to Mussoorie and other hill-stations in western UP. The wood is commonly used for fuel and for making small implements, while a red dye obtained from the flowers is used for dyeing silk. The leaves and twigs also yield a yellow dye,

while the bark and flowers are used in traditional medical practice.





Begonia dioica

2000-2700m. Jun.-Aug.

A common, though somewhat inconspicuous plant of shady forest banks and roadside thickets around hill-stations and foothill forests. The flowers are pink and white in colour.

A related species, *Begonia picta*, is more common and widely distributed, being found upwards of 600m. and going up to 2800m. The leaves of both species are distinctly heart-shaped and coarsely double-toothed.



Pleurospermum candollei

3500-4800m. Aug.-Sep.

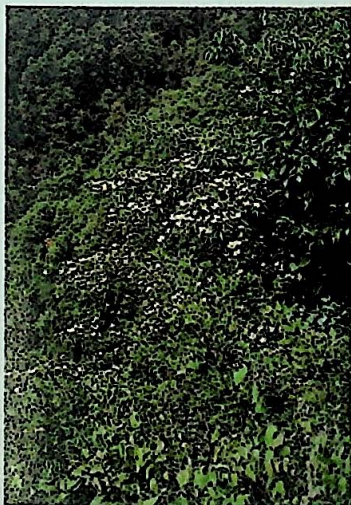
A curious little plant, almost always drawing attention to itself by way of the solitary umbel of flowers that are borne in little flat-topped clusters, giving an overall rounded appearance. Commonly seen at high altitudes, growing on open rocky slopes and screes, the plant has a conspicuous solitary leafless and hollow stem which is heavily grooved and bears the umbel of flowers.



Heracleum spp.

Approx. 1800-4400m. Jun-Aug.

A widely distributed family of medium-sized plants, often growing to 2m., with large leaves consisting of several neatly-arranged rows of leaflets and clusters of small white flowers. There are several different species found within our area, but many are difficult to identify without examination of the ripe fruit.



Benthamidia capitata

Dogwood Tree

1400-3200m. May-Jun.

A small deciduous tree of thick forest and well-wooded ravines and shrubberies around several of our hill-stations. The tree may be identified by the yellowish-white 'flowers' that grow at the ends of the branches. What appear to be large creamy flowers are actually clusters of very small flowers surrounded by 4 or 5 cream-coloured bracts that look like petals. The tree's bark is a smooth grey, and the fruit is highly edible.



Morina longifolia

3000-4000m. Jun.-Sep.

A common alpine meadow inhabitant, found throughout our area. The leaves have spiny margins and the white to pink-coloured flowers are borne on a long uninterrupted spike that could extend to as high as 1m.



***Randia tetrasperma*. Bhedra, Chhota Gingaru**

1400-2400m. Apr.-Jun.

A medium-sized shrub with stiff grey branches and greenish-white fragrant star-shaped flowers. Occasionally met with in thick forests around hill-stations such as Nainital and Mussoorie.



(Text overleaf)



Aster spp.

Flowering during the monsoons.

A large and confusing family of flowering plants belonging to the Daisy family, having in common outer florets that are lilac or purple in colour and inner or disk-florets, that are yellow.



Erigeron bellidioides

1200-3600m. Apr.-Nov.

A very common flowering plant of cultivated areas, open slopes and the vicinity of hill-towns, being especially common as a weed in hill-station gardens, throughout the Himalayas. The flower-heads grow in isolation, but the plant being gregarious gives the impression of its flowers growing in loose clusters. The flower-heads are 1-2cm. across and have many slender pale-pink or purple-and-white ray-florets and distinctively

yellow disk-florets. The main stem grows to about 25cm. and commonly spreads out on the surface of the ground.



Anaphalis triplinervis.

1800-3500m. Jul.-Oct.

A very common perennial that grows in rocky forest clearings and on grazing grounds, the leaves giving it the general appearance of a weed. The globular flower-heads consist of small-branched clusters of white flowers, encircled by white shiny papery bracts. There are several similar varieties but this is perhaps the most abundant in our area.



Leontopodium spp. Edelweiss
3000-4500m. Jul.-Oct.

This is a group of several species, many confusing and difficult to distinguish from one another owing to minute botanical details. Nevertheless, the flower

is distinctly identifiable as a member of this group to anyone who has seen the national flower of Switzerland or read the classic *Asterix in Switzerland!* The uppermost leaves cluster round the flower-heads in a spreading star-like cluster. The leaves of all species are white and woolly in nature. Found commonly throughout the higher meadows and pasturelands of our area.



Inula spp.

Members of the daisy family, these plants have flowers with both ray and disk-florets that are yellow in colour.

I. grandiflora is found between 2000-3300m., and flowers from July to September, being commonly found in shrubberies throughout our area, but most commonly in Kashmir. A medium-sized herbaceous plant, it has a terminal and solitary golden-yellow flower-head that measures to 6cm. across and is borne on a long leafy flowering stem.



I. obtusifolia is found from Pakistan to Uttar Pradesh and commonly grows between 3000 and 4000m., abundantly flowering in parts of Kashmir, between June and August. A leafy perennial with several stems, each bearing either a solitary or a small cluster of flower-heads, varying in size from 2-4 cm. The leaves are rigid and somewhat toothed.



Senecio spp.

Ragwort.

Approx. 2000-4000m.

Flowers post-monsoon. A widely-distributed family, with flower-heads that have both ray and disk-florets coloured yellow. Some species are shrubby in nature while others are herbaceous perennials.

S. Chrysanthemoides, a medium-sized erect perennial, grows gregariously in shrubberies between 2500-4000 m. and flowers in August and September, being locally abundant throughout our area. The leaves are deeply lobed and toothed, while the 1-2cm. across yellow flowers that grow in dense terminal clusters have about 10 ray-florets.

S. cappa is a shrubby perennial with large elliptic leaves. The flower heads are small (5-6 mm. across) but grow in dense branched clusters, having 8-10 ray-florets.

S. jacquemontianus is common in Kashmir and may be identified merely by its height which could be as much as 1.5m. The leaves are heart-shaped and the flowers grow in a spike-like cluster, the flower heads being 4-5cm. across, with 12-15 ray-florets.

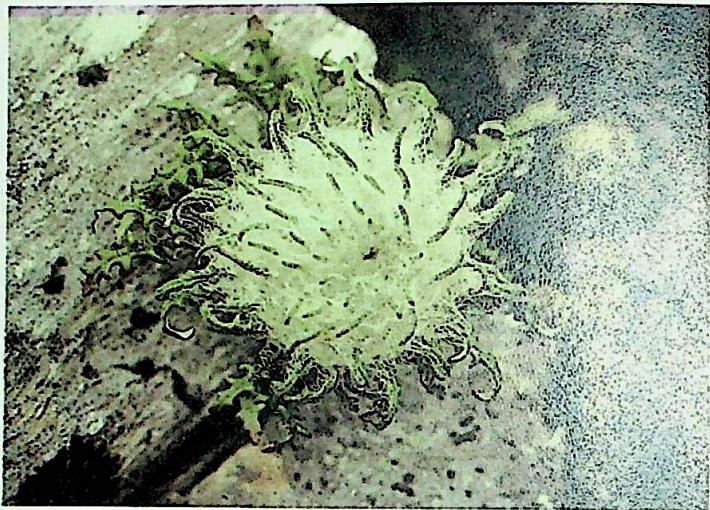


Saussurea obvallata

Brahma's Lotus ; *Brahmakamal*

3600-4500m. Jul.-Sep.

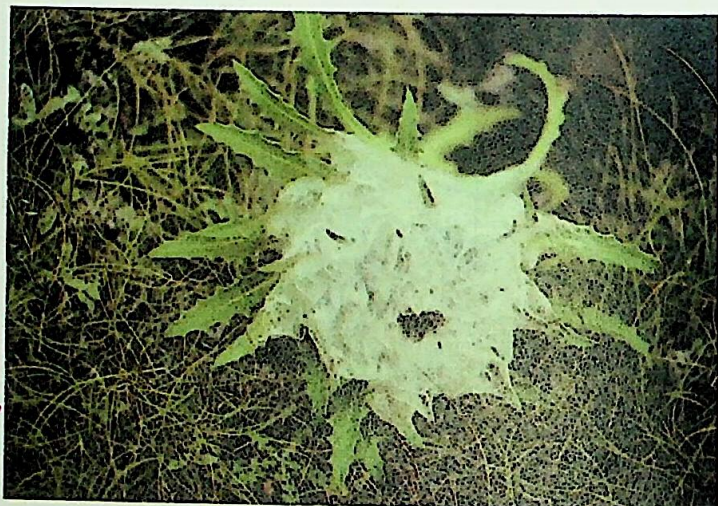
A very distinctive perennial which flowers during the peak of the monsoon season and cannot be missed in any of the high-altitude meadows of Garhwal, such as The Valley of Flowers or the Har-ki-dun. The large greenish-yellow structure of papery bracts that surround the camouflaged cluster of purple flower-heads within, may be seen growing on rocky slopes and by small mountain streams. The flowers are commonly offered in hill temples.



Saussurea gossypiphora

4200-5600m. Jul.-Sep.

A most curiously-structured flowering herb, the entire plant looks like a ball of cottonwool or even a snowball, as it is densely sheathed in a mass of long white-woolly hairs. The clusters of flowers are well embedded within the globular mass of hairs, as are the leaves which are conspicuously toothed or lobed, and covered with fine hairs. A fairly common plant of screes and open slopes at higher altitudes throughout our area, and a very striking sight when in flower.





Cirsium spp.

Thistle

A small family of plants found in forest clearings and by streams on hard and stony ground. The flowers are unmistakably Thistle-like with their white or purple petals and numerous papery bracts at the bases. The leaves, linear and acute, are triangularly toothed and have spines either on top or at the edges. Common throughout our area, around wasteland and cultivation alike.



Ainsliaea aptera.

1500-2800m. Mar.-May.

In early spring it is the slender sprigs of star-shaped white flowers growing on the stems that attract attention to this plant. The triangularly-rounded leaves follow shortly after by which time the flowers have died. Seen along forest trails and thin shrubberies throughout our area.



Gerbera gossypina.

Kupheru; Jhulu; Kapas.

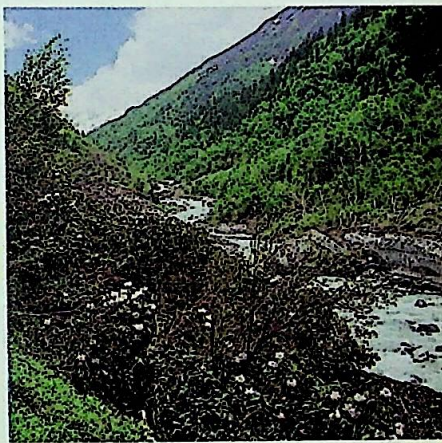
1200-2400m. Mar.-Jun.

A common plant of open grassy slopes and thinly-forested pine knolls. The daisy-like flower-head is generally white in colour and lightly tinged with pink; always grows solitarily on a long cottony leafless stem borne high above the leaves, which are woolly and white in colour. The cotton obtained from the leaves is used by the people of Jaunsar in Garhwal to make coarse cloth or bags.

Cassiope fastigiata

3000-4400m. Jul.-Aug.

A dwarf evergreen and much-branched shrublet with numerous tiny overlapping leaves and axillary white pendant bell-shaped flowers. A very characteristic plant found throughout our area in rocky terrain and on open alpine slopes, identifiable by the long dark-green spikes that grow in thick gregarious clusters.



Rhododendron campanulatum

Safed, Burans, Simris

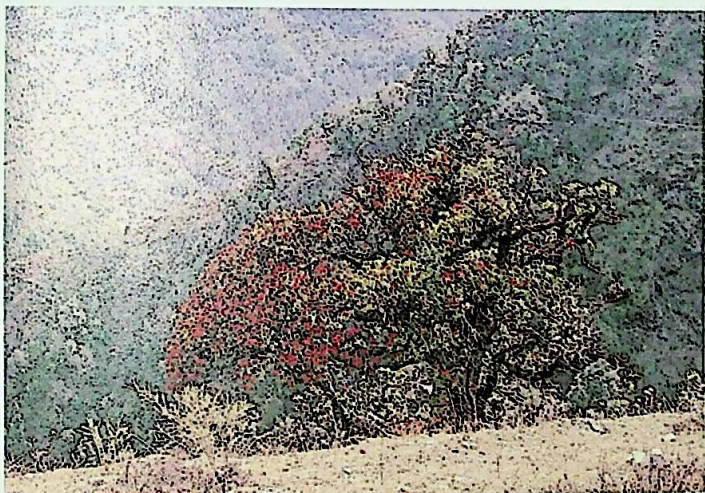
3000-4300m. May-Jul.

One of the most beautiful and characteristic species of Himalayan flora, the White Rhododendron is a common sight in the higher alpine shrubberies and forests throughout the Himalayas and well-distributed within our area. The flowers can come in a range of shades, from pure white or pinkish-to-pale-mauve and even lilac. The inside of the flower is

spotted with purple, while the glossy green leaves are generally elliptic in shape and have brown felted woolly hairs on the undersides. The bark is a dark shade of grey and the shrub itself often spreads out to as wide as 6m. The leaves are collected and brought down to the plains where they are used in the making of incense and local medicinal preparations.

(Photograph overleaf)





Rhododendron arboreum.

The Tree Rhododendron; The Arboreal Rhododendron; *Burans*.

1600-3200m. Mar.-May.

A medium-sized evergreen tree, common throughout the Himalayas by far the widest-ranging Rhododendron in our area. This flowering tree is characteristic of several of our hill-stations during the spring when the dense compact clusters of blood-red flowers adorn the boughs and colour entire hillside forests with a blaze of red. Found over a wide range of altitudes; if you are trekking in the Himalayas during the early spring, it is difficult to miss this species. The colour of the flowers tends to become light as the altitude increases and approaches a pinkish-white in some places. A robust tree that grows to 15m., the wood is often used for fuel and charcoal. The flowers are eaten and made into preserves and jams, worn as adornment by the village women and also offered in hill temples. *R. arboreum* is the national flower of Nepal.

(Photograph overleaf)





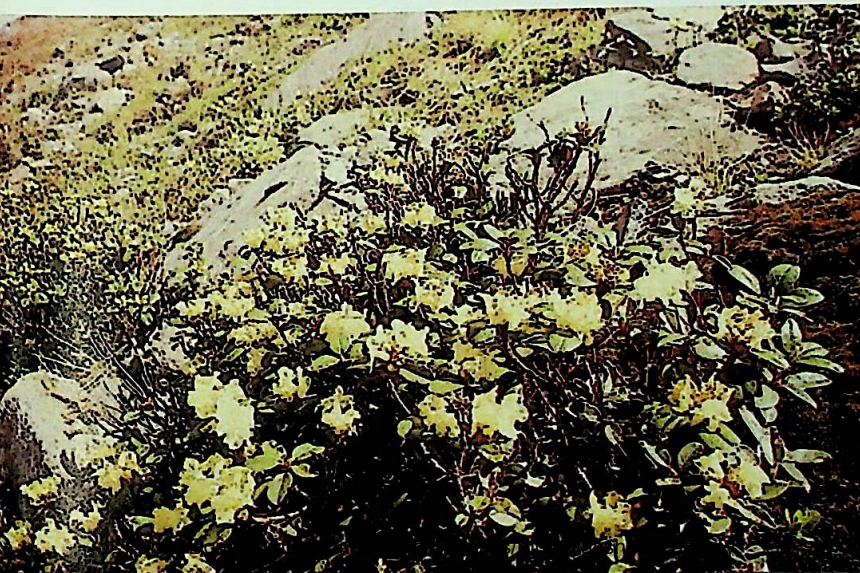
Rhododendron anthopogon.

Dwarf Rhododendron; *Talis, Talisi.*

3000-4800m. May-July.

A gregarious shrublet, commonly present in alpine shrubberies, and often forming a peripheral shrubbery around a dense thicket of *R. campanulatum* and often growing in the protection of a stand of *Betula utilis*. The white or yellow flowers grow in small compact clusters of 4-6 and individually measure about 2cm. across. The dark green oval-shaped leaves are strongly aromatic and densely scaly underneath. The leaves are collected, and mixed with Juniper are used for incense in Buddhist monasteries as well as offering for Hindu religious ceremonies.

(Photograph overleaf)







Rhododendron lepidotum

Simris; Talispatra

2400-4200m. Jun.-Jul.

A small aromatic shrublet with small clusters of 2-5 pink, dull purple or, less often, yellowish flowers each 2-3 cm. across. The leaves are dominant at the ends of the branches. More often seen growing in rocky terrain and light undergrowth in poorer soils as compared to *R. anthopogon*, which is more widely distributed in our area. This plant grows quite tall when competing with other plants, often exceeding

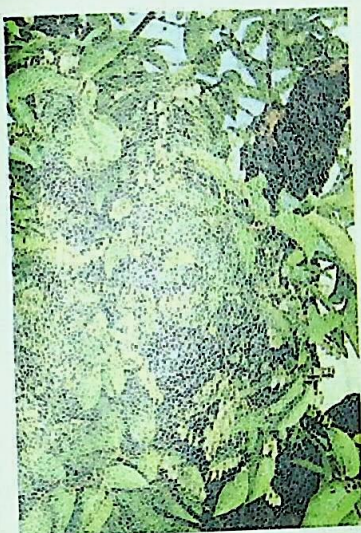
1 m., but most often no more than 40-50 cm. above the ground. The leaves, under the name of *Talispatra* are used as stimulants in various local medicinal preparations.



***Cicerbita macrorhiza*.**

1800-4000m. Jul.-Sep.

An uncommon plant of rocky terrain and open slopes, found throughout our area, but more often in Kashmir and in the Dachigam National Park, where it is common. The flower-heads are a light blue in colour and form into a terminal cluster at the end of a short leafless stem. The leaves can be very variable in shape, but usually bear rounded lobes.



Lyonia ovalifolia

Ayar, Anyar

1500-3000m. Apr.-Jun.

A locally abundant deciduous tree, growing to about 8 m., and always found in association with forests of Oak and the arboreal Rhododendron. The leaves are rather leathery and ovate in shape while the flowers are borne in horizontal axillary clusters, about 10 cm. long. The flowers are flask-shaped, restricted at the mouth and opening into five recurved lobes. The leaves are poisonous to livestock and are used to kill insects. Commonly found in

shrubberies near hill-stations in Himachal and Garhwal.





Gaultheria trichophylla.

2700-4500m. May-Jul.

A spreading low shrublet, growing close to the ground, with small elliptic leaves, bell-shaped pinkish flowers and fleshy blue fruit that is edible. A fairly common inhabitant of mossy banks and moist slopes to the north of Garhwal and Himachal Pradesh.



Androsace sarmentosa
2700-3700m. May-Jul.

A gregarious plant of open slopes and shrubberies, identifiable by its dense umbels of delicate pinkish flowers borne on long flowering stems, high above the clumped leaves. The 10-12 cm. long stems and leaves which grow in rosettes are densely silky-haired. Fairly common throughout our area and seen growing in a wide variety of situations.

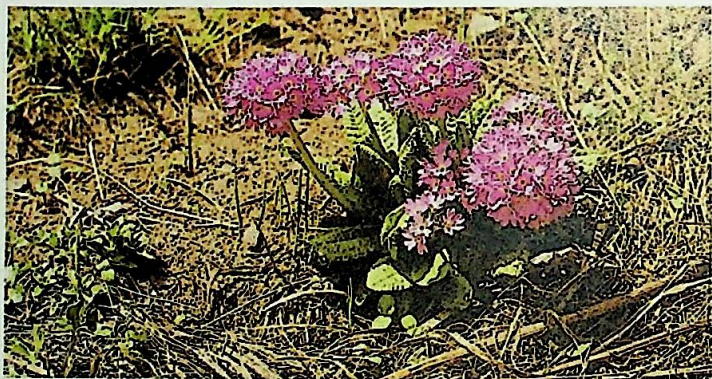


A. rotundifolia, a related low- altitude species is very common throughout our area and may be distinguished by its rounded and deeply-lobed leaves and its long-stalked cluster of pink flowers.

In Kashmir, there is an endemic species, *A. primuloides*, which has a similar appearance to *A. sarmentosa* and is common on alpine pastures and meadowlands such as Gulmarg and Sonemarg.



A. delavayi is a high-altitude Androsace, usually growing as a dense cushion, with solitary stalkless whitish-cream flowers, with yellowish eyes. The individual 'cushion' rarely exceeds 5-6 cm. in width while the flowers themselves measure to about 7 cm. Fairly abundant in stony areas between 4400 and 5000 m., the plant's flowering time is from June to August.



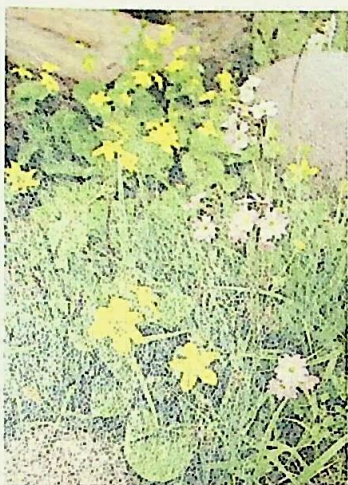
Primula denticulata

1500-4200m. Apr.-Jun.

The most common and distinctive species of the genus *Primulaceae* which has its largest concentration in the Himalayas, *P. denticulata* is a common inhabitant of shrubberies, grasslands, open slopes and meadows throughout the Himalayas. The flowers may range from a deep purple to a washed-out mauve and grow in compact heads, at the ends of stout flowering stems which could extend up to 15 cm. long depending on the surrounding vegetation. The crinkled-looking, heavily-toothed leaves take a back seat during flowering time but grow quite large and broad once the flowers have withered away at the end of spring. A prominent bloom along several wilderness trails as well as in town gardens in the hills throughout our area.







Primula involucrata

3000-4500m. Jun.-Aug.

A common and highly gregarious plant of moist ground, be it a streamside or a snowmelt bog.

The flowers range from a delicate lilac to white in colour and sport a yellow or pink eye.

The leaves are toothed and rough, while the flowers are borne on a stout leafless

flowering stem. Found throughout our region, and distinctly common in the meadows of the Govind Pashu Vihar of Garhwal.



Primula reptans (Text overleaf)



Primula reptans

3500-5400m. Jun.-Aug.

A dwarf variety of Primula, growing at higher altitudes, spread-out and close to the ground, frequenting stony and dry slopes. The tiny leaves hug the ground and even the pale pink flowers appear to be entirely stalkless and measure a mere 1.5 cm. across.



Primula petiolaris

2400-3600m. Apr.-May

A common Primula found in middle-altitude forests, the flowers are a delicate pink with a yellow eye and a thin white border around it. The flower petals are generally rounded and toothed at the tips. The flowers measure about 2 cm. across and are more or less stalkless. Like some of the other Primulas, the leaves form a dense rosette during flowering and spread out shortly after the death of the bloom.

Primula macrophylla

3300-4800m. Jun.-Aug.

A gregarious high-altitude Primula of open moist ground and rocky slopes close to the summer snowline, widely distributed throughout our area but nowhere common. The flowers are very variable both in colour and form, but usually grow in compact terminal clusters of 5-20. The most common colour is a purple, but violet and lilac forms are also seen, which can make identification quite confusing at times. Look for this attractive species on the higher trails of Himachal and western Garhwal.

(Photograph overleaf)

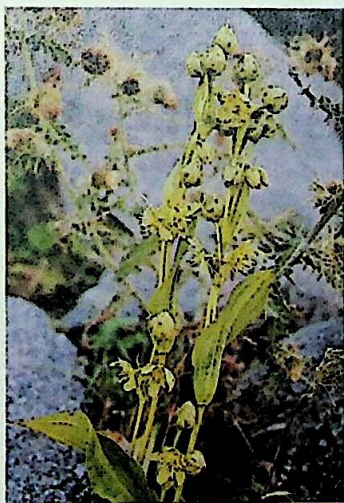




Primula edgeworthii

2200-3600m. Apr.-May

The blooms of this *Primula* are very variable in colour and range from blue to pink and even white, with an orange eye bordered with white. The flower petals are irregularly toothed and the flowers are borne on short flowering stems.



Swertia petiolata

3200-4500m. Jul.-Aug.

A fairly common inhabitant of open meadows and rocky terrain, this plant is common in Kashmir and in some parts of northern Garhwal. The distinctive features are the greenish-grey flowers with blue-green veins, growing singly or in pairs in spike-like terminal clusters.

Gentiana spp.

Gentians

A large genus of over 60 species, many differing by minute botanical characters. It is easy to identify plants as belonging among the Gentians by the characteristic shape of the flowers — the corolla being funnel-shaped and longer than the lobes. This is generally an autumn-flowering genus. Some are found at considerable altitudes, such as *G. algida*, *G. carinata* and *G. argentea*. Others, such as *G. kurroo* and *G. pedicellata* are found at lower altitudes.

(Photographs overleaf)

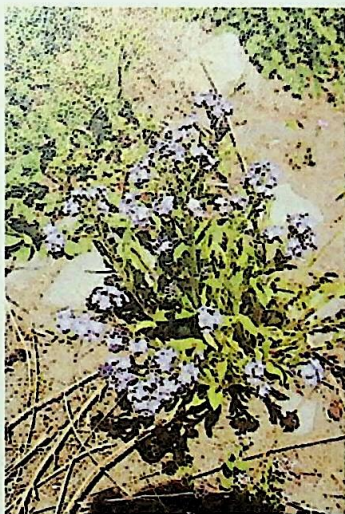




Hackelia uncinata

2800-4000m. Jun.-Aug.

An inhabitant of middle-altitude shrubbery and forest, being fairly common. The flowers, borne in lax clusters, are blue in colour and have a yellow ring of blunt scales at the centre. The leaves are broadly elliptic and narrow-pointed in shape and set this species aside from *M. alpestris*, which has long narrow leaves.



Myosotis alpestris

Alpine Forget-Me-Not

3000-4200m. Jun.-Aug.

A small hairy perennial, with dense compact clusters of blue flowers with yellow eyes, each flower measuring about 1 cm. across. The stem grows to about 15 cm. and is branched only at the inflorescence. Met with on open slopes and on rocky terrain, frequently around the lower moraines of glaciers throughout our area.

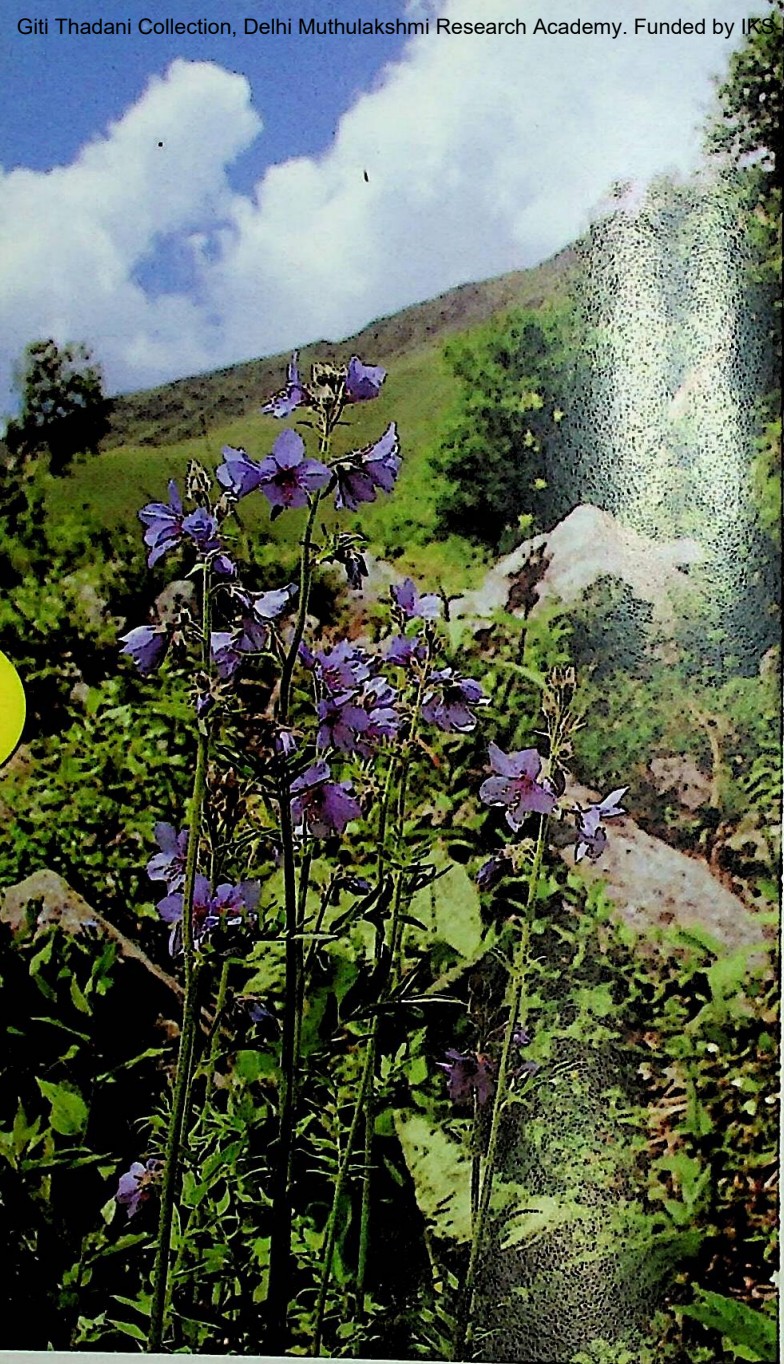
Polemonium caeruleum spp. himalayanum

Jacob's Ladder

2400-3600m. May-Sep.

This widespread perennial of shrubberies and forest edges is common in Kashmir and in most parts of Garhwal and Himachal Pradesh. The pale blue flowers grow in a terminal cluster which is occasionally branched. The leaves have several pairs of smaller leaflets while the stem is erect and unbranched except at the inflorescence.

(Photograph overleaf)

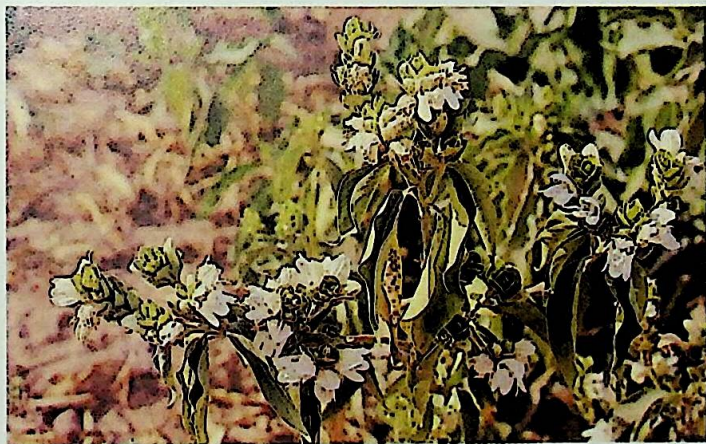




Leptocassimeriana

3400-4000m. Jun.-Aug.

A common alpine meadow inhabitant, commonly found in Kashmir and parts of western Himachal Pradesh. A small plant bearing dense spikes of blue to purple flowers, 3-4 cm. long. The leaves are oblong to elliptic in shape and are toothed. This plant has been used in traditional medicine since ancient times.



Justicia adhatoda

Bansa, Arusa, Vasika

Up to 1600 m. Feb.-May

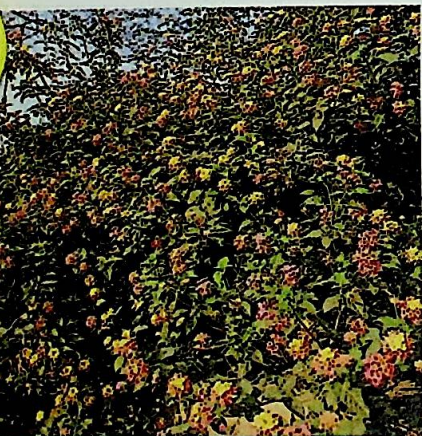
An evergreen and gregarious shrub of wasteland and shrubbery, with a strong fetid smell and small clusters of white flowers with brown streaks within. The leaves are important ingredients in traditional medicinal practices where they are used to cure coughs and asthma and the flowers are used for ophthalmia.



Nepeta spp.

Catmint

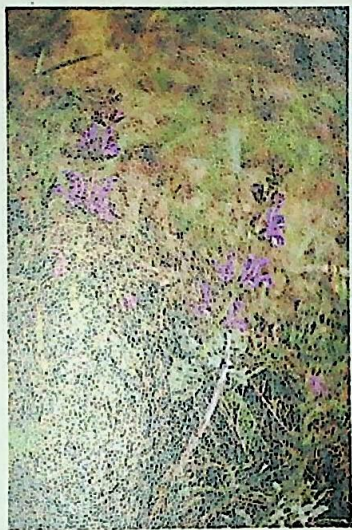
A large and confusing family of middle to high-altitude flowering plants of the Mint family. The flowers usually grow in whorls of dense unbranched spikes. There are several varieties and distinctions between them could be slender. However, the flowers of the different species look similar in most cases.



Lantana camara

Up to 1600 m.

Flowering through most of the year. A native of tropical America, it has become naturalized and even turned into a troublesome weed in some areas, being common around cultivation and hedges. A medium-sized aromatic shrub with small recurved prickles on the branches and long-stalked heads of numerous flowers, commonly yellow or orange in colour, but ranging from purple and crimson to cream and white in areas like the Dehra Dun valley.



Salvia lanata

Sage

1500-2600m. Apr.-Jun.

A woolly-white plant, with low basal leaves, and a flowering spike of bluish-purple flowers. The leaves are slightly toothed and distinctly woolly in texture, being off-white in colour. A fairly common perennial around hill-stations throughout our area, especially the Mussoorie-Chamba ridge in Garhwal.



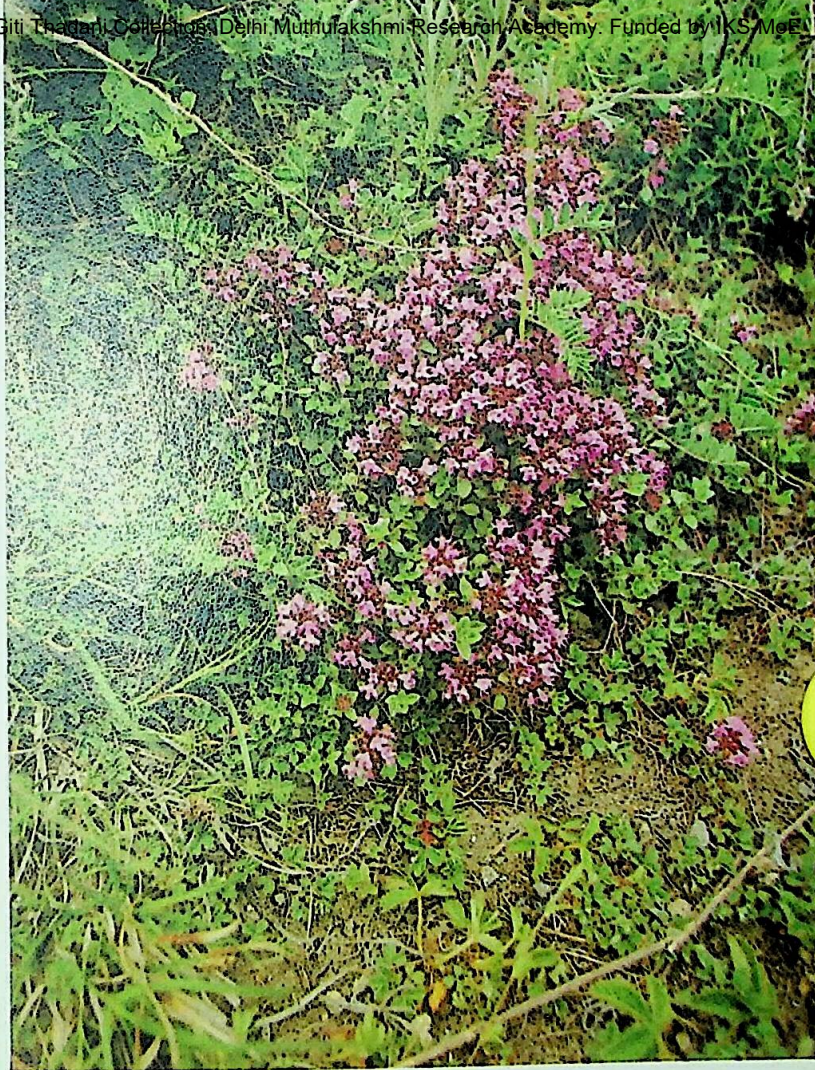
Aconogonum spp.

Approx. 1500-3500m. Jun.-Sep.

A small genus of common shrubby plants found in forests and frequently seen flowering in roadside shrubberies in the middle hills. *A. campanulatum* is the most common species in the eastern part of our area (eastwards of Garhwal). It is found in damp locales, by moist ravines, thick shrubberies, or the banks of rivers. An erect and tall herbaceous perennial, frequently growing to over a metre in height, it may be distinguished by

the spreading hairy and dense clusters of pink or white flowers which are really quite small (3-4 mm. long) and shaped like bells. The leaves are typically elliptic and pointed.





Thymus linearis

Thyme, Hasha, Ajwain

1800-4200m. Apr.-Sep.

A small aromatic shrublet, about 15-30 cm. high, with many tiny oblong leaves and delicate little whorls of purple or pinkish flowers growing in fairly dense clusters, occasionally crowding over the leaves. The plant has many medical applications. *Ajwain*, which is used in India and Europe as a culinary herb, is obtained from garden varieties of this plant.



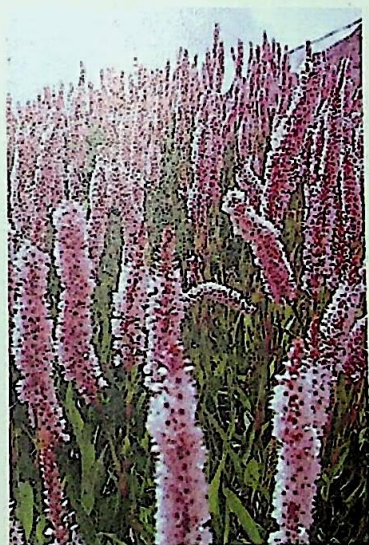
Bistorta spp.

Monsoon Flowering

3000-4500m.

A common and well-distributed group of high-altitude flowering plants, with flowers growing in dense terminal spikes. The plants are usually gregarious and in the flowering season which coincides with the monsoons, they colour entire hillsides and meadows with their dense growth of flowering spikes.

B. affinis is a spreading mat-forming plant that is found throughout our area, at altitudes ranging from 3000 to 4800 m. It is commonly found on open slopes and screes, and flowers between the months of June and September. The leaves are narrow and elliptic in shape, while the flowers that grow in cylindrical spikes are coloured various shades of pink or red. The flowers are borne at the ends of short flowering stems, which could grow to 25 cm.



B. vivipara is found from 3500 to 5000 m. in the northern part of our area and frequents damp open slopes and grassy meadowlands, often near snowmelt streams and bogs at high altitudes. Flowering in June and July, well before the other species, the flowers are coloured a delicate pink or white and grow on solitary slender stalks, often up to 15 cm. long. This is a very

variable plant, the flowers ranging in size from 2 to 4 cm. The leaves grow in a dense cluster at the base of the plant, have a leathery texture, measure to about 10 cm. and commonly have inrolled margins.

B. macrophylla is found eastwards of Garhwal, over a wide range of altitudes upwards of 1800 m., and frequents open slopes. It may be distinguished by its rounded and small terminal cluster of drooping pink or red flowers, each of which measures no more than 1 cm. long.



Daphne bholua

2000-3300m. Sep.-Apr.

A fairly short shrub of forests and shrubberies, evergreen or deciduous, depending upon the altitude it is found at. While the leaves are dull green and leathery, the flowers grow in clusters and are pinkish-white in colour and sweet-scented. In parts of Nepal, the inner bark is used to make paper.





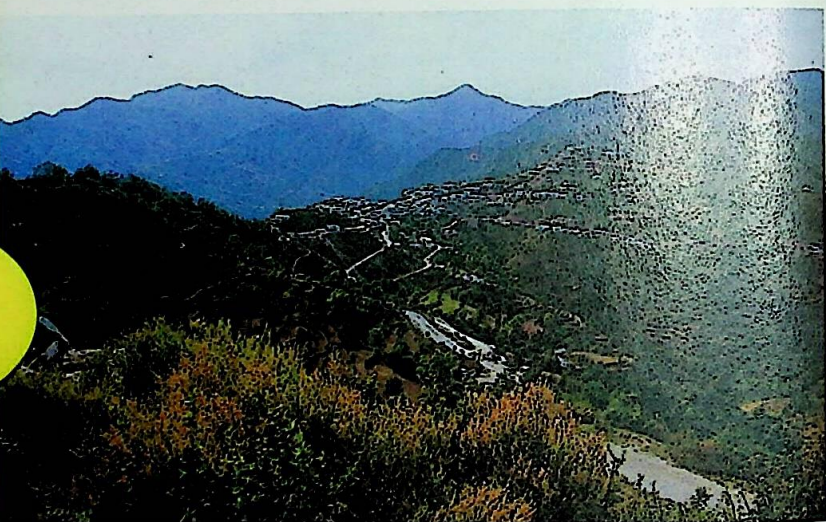
Rumex hastatus

Sorrel; *Chulmora*, *Bhilmora*

1000-2600m.

Flowering throughout the year, with local variation.

A widespread undershrub common on open hill slopes, or clinging on to stone embankments by hill roads and old bridges. The rather bushy shrub has small arrow-shaped leaves that grow close to the stem, while the tiny greenish-white flowers are borne in dense clusters at the ends of the branches. Very frequently met with around all of our hill-stations.



Oxyria digyna

Mountain Sorrel

2600-4000 m. May-Jul.

A common plant of open slopes and alpine grazing grounds, it may be identified by its pale-green rounded to heart-shaped leaves, and its many spikes of tiny pinkish-green flowers. Like Rhubarb and related plants, the leaves are edible raw.



Stellera chamaejasme

2700-4200m. May-Jul.

An attractive herbaceous plant, found on high-altitude pastures and by cultivation in parts of Garhwal and Kumaon. A thick rhizome gives birth to several leafy stems with terminal dome-shaped clusters of very sweet-scented pinkish-white flowers.



Euphorbia cognata

Spurge

2200-3500m. May-Jul.

A small shrub, erect and spreading, with milky juice in the stems. The flower structure is unmistakable, a much-branched flat-topped structure of many yellowish flower-heads, each surrounded by yellow-green bracts.



A similar species, *E. wallichii*, is difficult to tell apart from *E. cognata*, except that the latter has its fruit covered with small swellings and the flowers have glands with long hairs within.



Cannabis sativa

Hemp; *Bhang*

Up to 2500m. Jun.-Sep.

A very common strong-smelling annual, found at the edges of cultivation and by roadsides. The distinct leaves, divided into several finger-like leaflets and joined together at the base, each leaflet being coarsely toothed, make identification unmistakable. The flowers are small and insignificant, being greenish-yellow in colour and growing in small clusters. The intoxicating drugs *Charas*, *Ganja*, *Pot* and *Bhang* are composed of extracts from the young leaves, flowers and stem. The fibre hemp is manufactured from the stems of the plants and is used to make rope and weaving cloth.

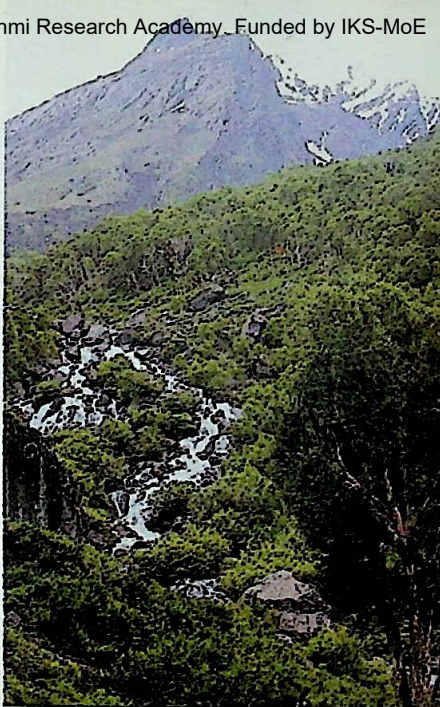


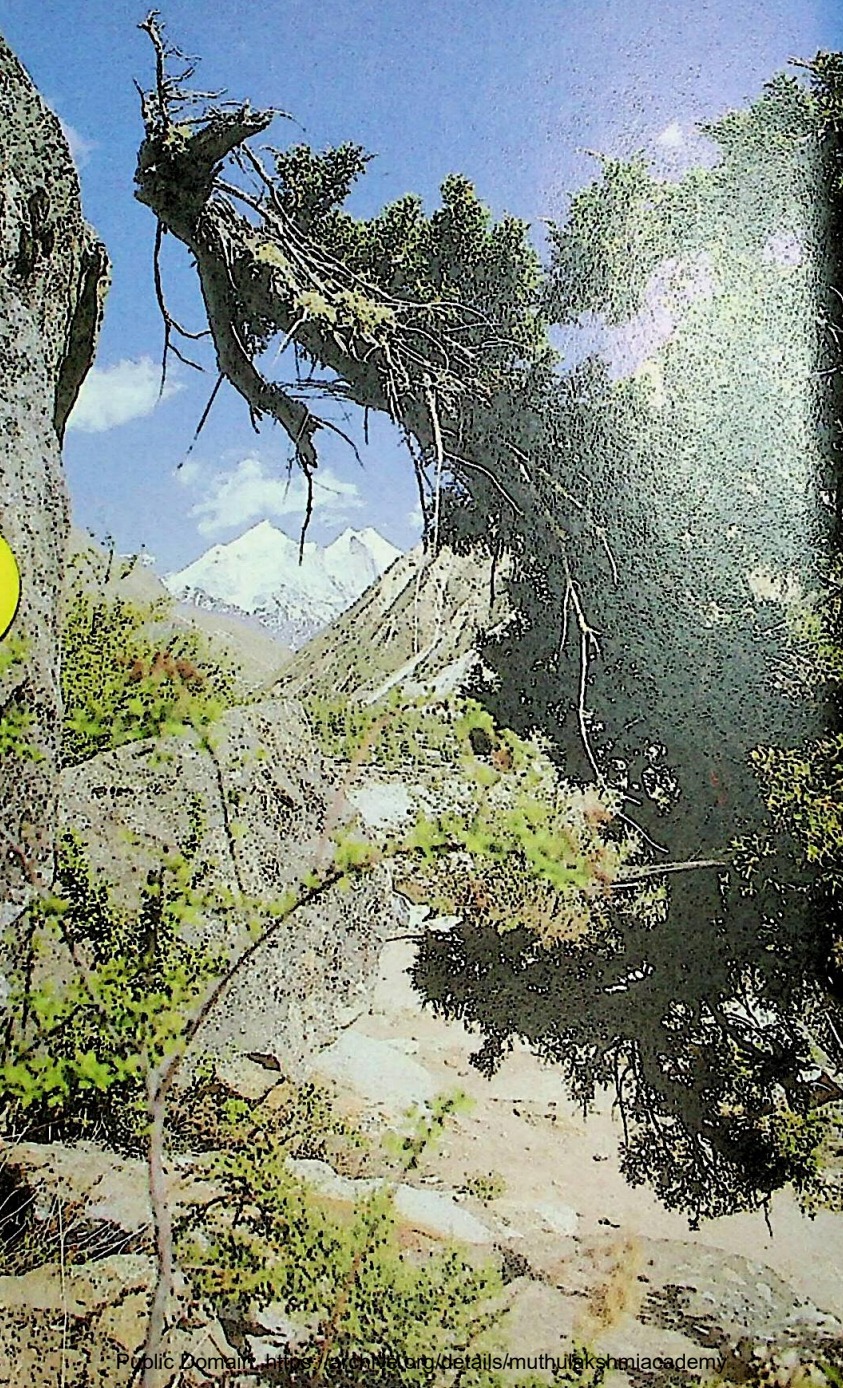
Betula utilis

Birch; *Bhoj Patra*

2800-4200m. Apr.-Jun.

The famous *Bhoj Patra*, which was used in ancient times to record great works of Indian literature is the bark of this tree which forms thick forests at the upper limit of the tree-line through most of the Himalayas and is particularly common in our area, several specimens growing to be several hundred years old. The brown bark, growing silvery white on maturity and peeling off in thin horizontal strips makes the stands of Birch quite an impressive spectacle high up in the Himalayas, as they often grow close to the glaciers and the summer snowlines. The woolly-haired light green leaves and white fruiting catkins in season offset the white of the bark.







Juniperus squamata

The Weeping Blue Juniper; *Guggal*

3000-4500m. Jun.-Jul.

A prostrate bushy shrub, growing in a compact cushion, with only the actively growing shoots separating from the cushion. Commonly seen growing in the higher valleys, sometimes at the highest level of the treeline, in company with *R. anthopogon* and clusters of *C. fastigiata*, or among the lower alpine meadows. It often spreads out over the surface of a large rock. The leaves grow in whorls of three and are long, linear and aromatic in nature. The fruit is an oblong purple berry. The wood is used as a fuel in the higher reaches where other fuel wood is hard to come by. The leaves and wood are burnt as incense. A common shrub throughout the higher reaches of our area, the Weeping Blue Juniper is especially prominent on Chur mountain in the Shimla Hills of Himachal and most parts of higher Garhwal, as in the Gangotri and Tons valleys.



Calanthe tricarinata

1600-2800m. Apr.-Jul.

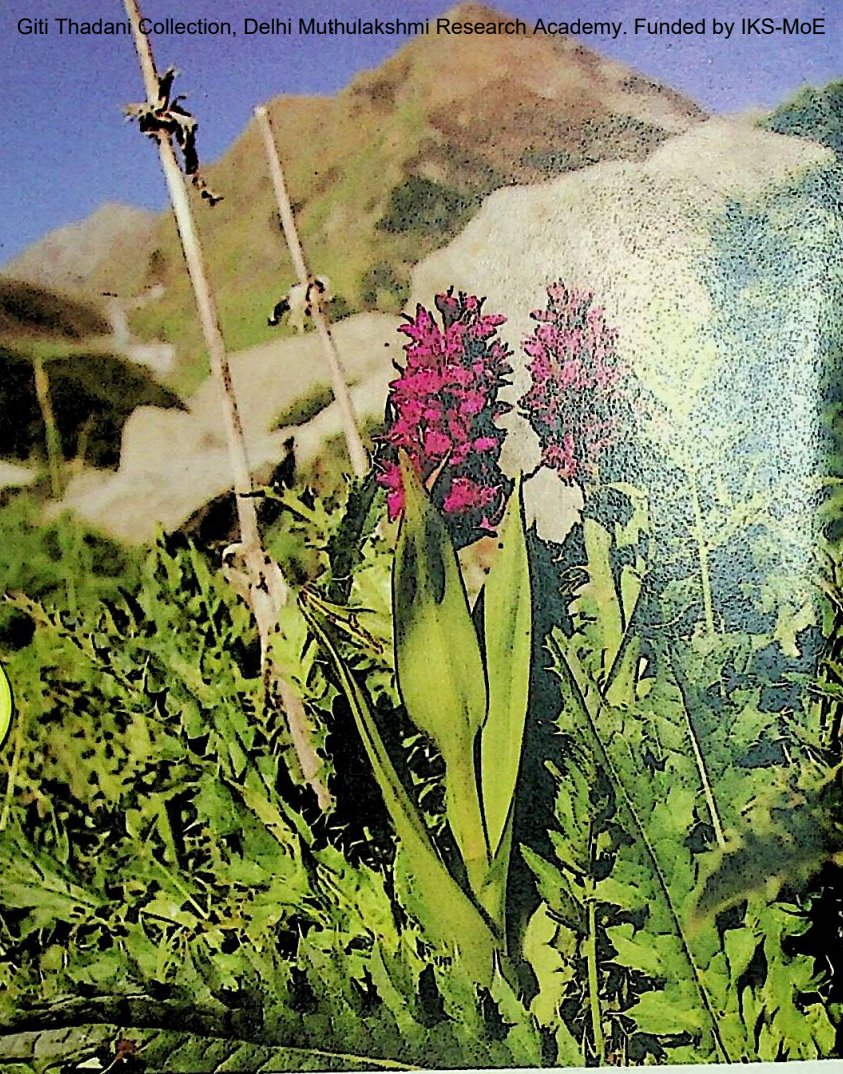
A common terrestrial orchid found in thick forest ravines, usually near flowing water, and common in Himachal Pradesh and Garhwal. The 2-3 cm. long flowers are borne alternately on an erect flowering stem, well above the leaves. The leaves are long and grooved while the flower has petals that are generally a yellowish-green with a reddish-brown lip.

Aerides multiflora

Foxtail Orchid

Up to 1000m. Apr.-Jun.

A forest epiphyte, most frequently seen growing on trees. The flowers, coloured white and tinged with various shades of pink, are borne in drooping spikes. The leaves are leathery in texture and folded longitudinally, usually drooping. A common orchid in the Doon valley, with its range extending east through the Rajaji and Corbett National Parks.



Dactylorhiza hatagirea

2800-4000m. May.-Jul.

A common alpine of open slopes and well-watered high-altitude valleys. Usually seen growing in twos and threes, the purple-red flowers are borne at the end of a leafy stem in a dense and compact spike. The plant is quite leafy, the leaves extending to 25 cm. in length; however, the main flowering stem extends up to 70 cm. from the ground. The tubers of this plant are greatly sought after for local medicinal preparations.



Roscoeae alpina

2500-3800m. Jun.-Aug.

A short forest plant, with a distinctly orchid-like bloom, this plant is found sporadically throughout our range, with a distinct predilection for light forest cover. Only one flower appears at a time, the colour ranging from a dark purple to a pale pink and white. The upper petal is rounded into a hood, while the side petals are narrower. Usually seen growing in small abundant patches in forest clearings.



Crocus sativus

The Saffron Crocus; *Kesar*

Up to 1200m. Sep.-Nov.

A native of Spain and parts of W. Asia, the Saffron Crocus is widely cultivated in Kashmir, especially in the area of Pampur near Srinagar. The flowers are a deep violet in colour, shaped like a funnel; prominent in the bloom are the brick-red stigmas and the orange styles which are collected and when dry form saffron, a much prized flavouring for food, and also used for medicine, perfume and formerly as a dye.

Iris kemaonensis

Kumaon Iris

2800-4000m. Apr.-Jul.

One of the prettiest Himalayan alpine, the Kumaon Iris is a common sight on alpine meadows, pasture lands and open slopes throughout our range. Often seen growing gregariously or in thick individual clumps, the flowers themselves grow solitarily and are more or less stemless, making their appearance along with the fresh leaves in spring. The colour of the bloom is an enchanting bright lilac with dark blotches of purple and the petals have central tufts of yellow hairs called 'beards'.





Roscoea purpurea

1600-2800m.

A common plant seen around the hill-stations of Kumaon and Garhwal and eastwards, it is found growing on lightly-grassed hill slopes and in forest clearings. The flowers range in colour from a pale pink and white to an intense mauve. The flowers are borne at the tips of the flowering stem which is swathed in a long purple connective 'tube' up to the terminal flower. A veterinary preparation is made out of the roots.





Allium humile

Spring Onion, *Jamboo*, *Lahsun*

3000-4000m. May.-Aug.

Clumps of the white-flowering Spring Onion commonly grow on the higher meadowlands throughout our region. The flowers are star-shaped and borne in loose umbels, while the plant itself is leafy, the leaves being long, narrow and flat. The leaves are commonly eaten as garlic by locals and porters who accompany expeditions up to the high altitudes.



Zephyranthes carinata

The Crocus Lily

Up to 2400m. Apr.-Jul.

A common flowering lily found in the vicinity of most of our Himalayan hill-stations, but rarely far from human habitation of some sort. A native of Mexico, it has become largely naturalized. The funnel-shaped pink flowers grow on solitary stalks, usually in large clumps. The leaves are flat, quite thick and usually quite long as well.



Yucca aloifolia

Aallo

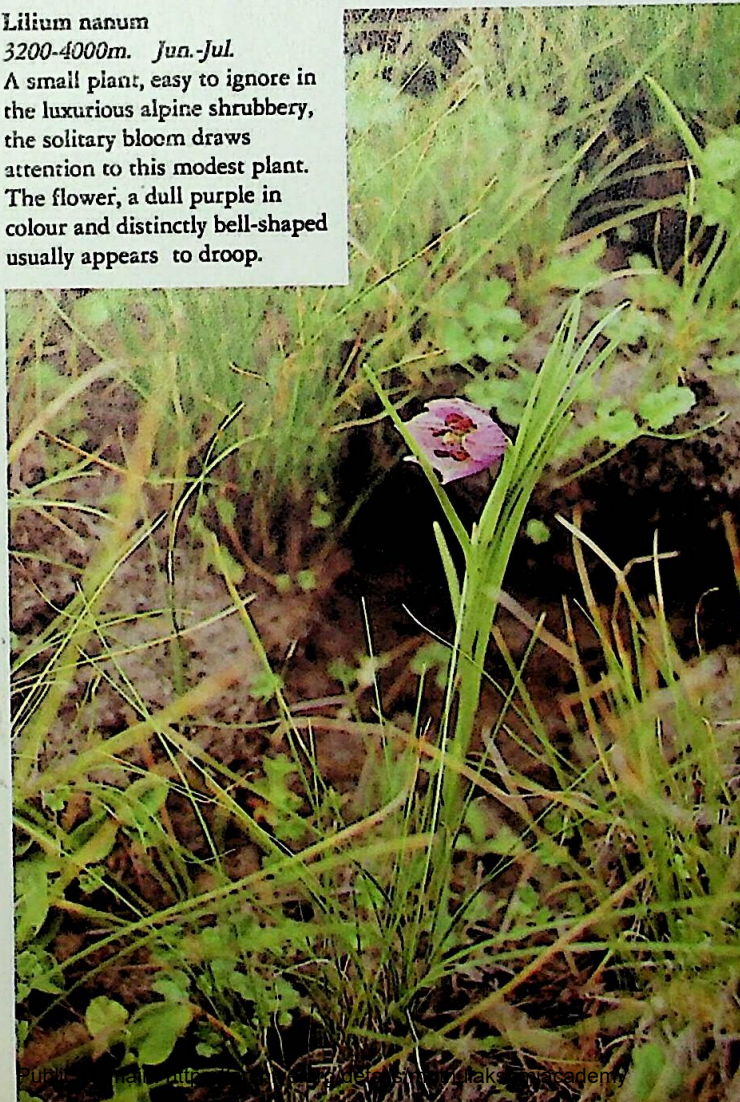
Up to 2000m. May-Sep.

A native of the Americas, this plant was originally cultivated along roadsides in parts of Garhwal and Himachal Pradesh, but is spreading quite rapidly and may be seen in the vicinity of several hill-stations. The leaves are stiff and sword-shaped, the flowers being whitish in colour, and growing in long branched clusters, up to a metre in length.

Lilium nanum

3200-4000m. Jun.-Jul.

A small plant, easy to ignore in the luxurious alpine shrubbery, the solitary bloom draws attention to this modest plant. The flower, a dull purple in colour and distinctly bell-shaped usually appears to droop.





Gloriosa superba

The Glory Lily; *Kalhari*

Up to 2000m. Jun.-Sep.

A tall scrambling creeper-like herb, growing up to 8 feet high, with oblong leaves spirally twisted to form a tendril. The strikingly beautiful flowers are generally yellow in colour with a patch of bright red on the upper portion. Common in the eastern parts of Himachal Pradesh and the valley of Dehra Dun and the Rajaji National Park in Garhwal, the roots of the Glory Lily are considered a virulent poison in ancient Indian medical practice and are used in medicine.



Lilium oxypetalum

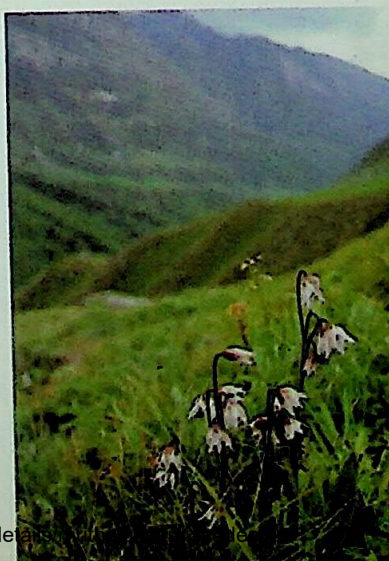
2900-3800m. Jun.-Jul.

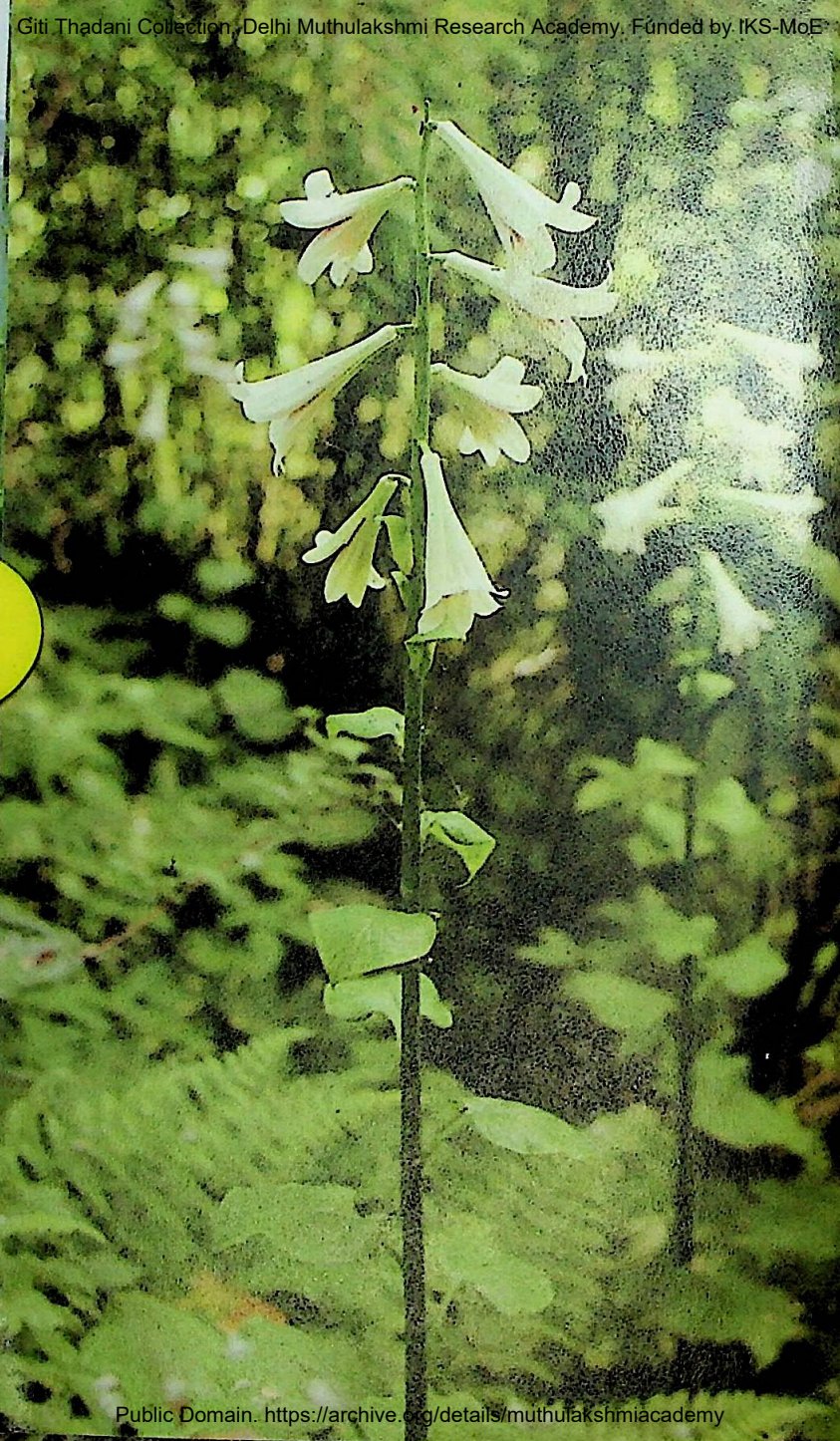
A leafy plant with a showy bloom, this is a Lily of open slopes and moist alpine ground from Himachal Pradesh and through Garhwal-Kumaon. The delicate pale yellow to cream blooms are borne on the main stalk, slightly raised above the leaves. Usually growing solitary, but sometimes in twos, the petals of the cup-shaped flowers splay out from the base. The entire plant is very leafy, the leaves being thick and up to 8 cm. long.

Lloydia longiscapa

3500-4200m. Jun.-Jul.

A small delicate plant, usually growing in small clusters, with white flowers marked with brown towards the base of the spreading petals. The leaves are thread-like and were it not for the flowers, the plant would pass off as grass. Found throughout our area, on open or grassy slopes.



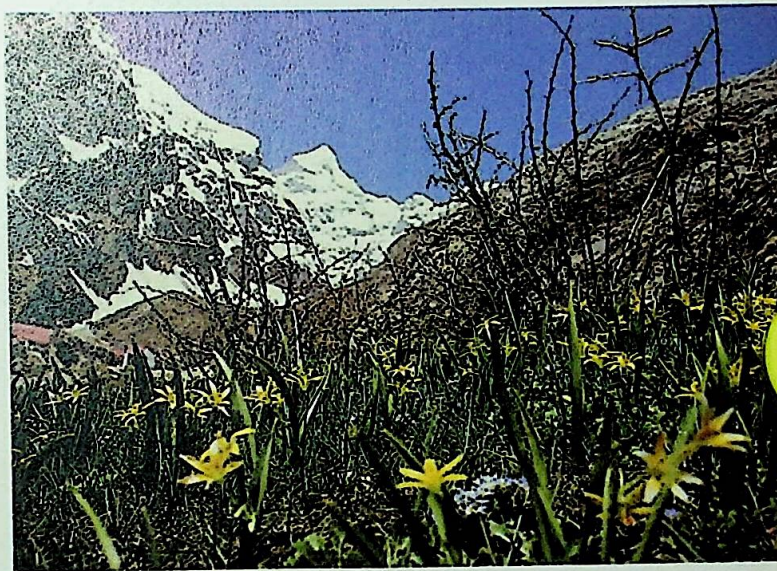


Cardiocrinum giganteum

The Giant Hill Lily; *Giotra*

1800-2500m. Jun.-Aug.

This largest of all lilies commonly grows to a height of 4 m., and may be frequently seen in damp well-forested ravines throughout our area. The white flowers are large, growing up to 18 cm. in length, funnel-shaped, drooping and highly fragrant. The leaf-blades grow to a quarter of a metre in length and are quite broad. In parts of western Garhwal, village kids make trumpets that produce deep bass notes from the dried and hollowed-out flowering stems.



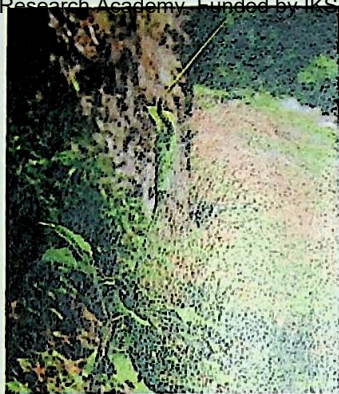
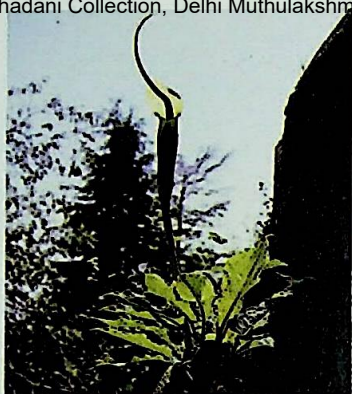
Gagea elegans

Yellow Star-of-Bethlehem

2000-3800m. Mar.-May.

A small inconspicuous plant with grass-like leaves, save for the small yellow star-shaped flowers which usually grow on short to medium-length stalks, and often close to the ground. A common plant of open ground, and usually one of the first to flower after the snows of winter, it may be seen on pasture lands throughout our area.





Arisaema tortuosum

1500-2800m. May-Jun.

This is a smaller version of the previous Cobra plant, being found at lower altitudes, and commonly seen around most of our hill-stations. A plant of shrubbery, thick forest, and open slopes alike, the outer bract or spathe is usually green in colour, while the thread-like appendage borne from within the spathe is up-curved and usually green in colour. This plant sometimes grows very tall and has several flowering stems, but most often

it is seen growing to about a half metre in height and bearing just one flowering stem.

Arisaema utile

Cobra Plant

2500-4000m. May-Jul.

This very curious plant has a flower that is shaped like the extended hood of a Cobra. Occasionally met with along forest trails and in shrubbery, the leaves that are divided into leaflets of threes, and the flower which is borne on a tall flowering stem give away its identity. The flower has a large outer bract enclosing the flower-head, known as the *spathe*. In this species, the spathe is purple in colour and has whitish stripes. A thread-like appendage, about as long as the spathe, extends forward from within the bract. Found eastwards of Himachal Pradesh.





***Arundinaria* spp.**

Ringal Bamboo; *Ringal Bans*

1200-2200m.

There is a number of species of Bamboo, large and small, found in the Himalaya. The species belonging to this group are the most prominent, being collectively called *Ringal* or *Ningal* in the hills. Found throughout our area, either in small clumps within forests or forming a thick impenetrable undergrowth within moist shaded ravines. The leaves are thin, long and pointed and the plant is very leafy. However, it would be a rare sight were you to encounter *Ringal* in flower as the flowering season comes once in about 25 years. The flowers are reported to occur on leafless stems in large branched clusters. The wood is used to make fishing rods, baskets, mats and for covering the roofs of huts.



Remusatia hookerana

1400-2500m. May-Jul.

A plant of shaded and moist forest banks, and sometimes seen growing out of tree hollows, the flower resembles in some way the Cobra plant, but is very much smaller, the plant being shorter. The leaves are solitary and usually make their appearance after the flowers do. A fairly common plant around our lower hill-stations in Himachal and Garhwal-Kumaon region.



Ophiopogon intermedius

1600-2700m. May-Jul.

A small plant of dense forest banks, with terminal spike-like clusters of delicate drooping white flowers, borne on hard leafless stems, arising from the many grass-like leaves. The cup-shaped flowers and their spreading petals distinguish this from other similar plants.



Commelina paludosa

Up to 3200m. Jun.-Aug.

A small herbaceous plant, usually growing to below 40 cm., with broad leaves enclosed by sheathing bases, and with small attractive blue flowers. The flowers have three petals and are borne in the axils of funnel-shaped bracts that have a glue-like sticky substance within. Common in light shrubberies in the lower hills.

EPILOGUE

(Environmental threats to Himalayan flora)

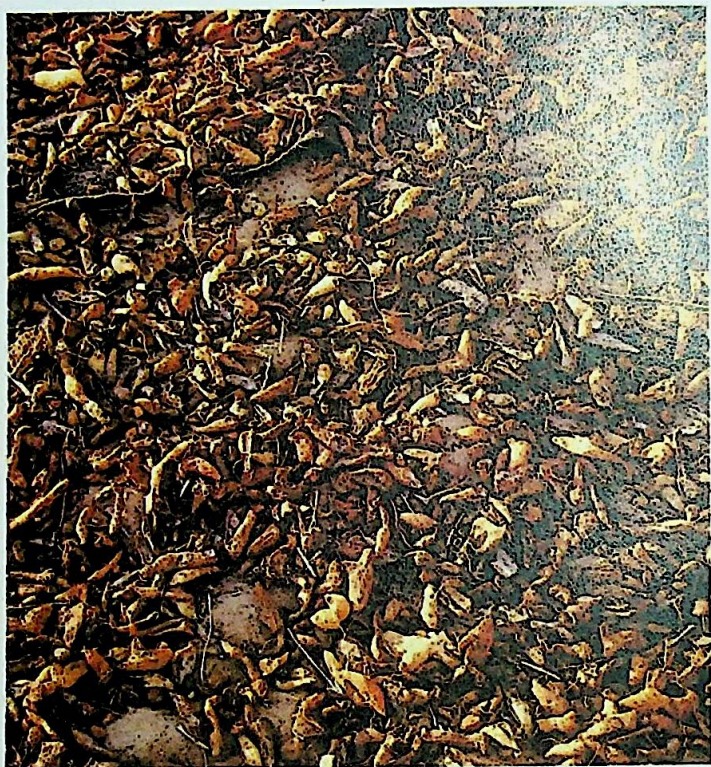
The average visitor to the Himalayas does not perceive the extent of pressure from human activity that is being put on the fragile ecosystems of these mountains. The Himalayas are a massive range and like the rest of nature, their systems have tremendous elasticity to withstand various pressures, but there are places where this sense of elasticity has been exceeded and the natural systems are not able to return to normal.

While the history of human occupation in most presently occupied portions of the Himalayas dates back to several thousand years, the history of human pressure does not and appears to be a relatively new phenomenon. Although a large part of the human pressures experienced in the Himalayas today are a result of resource exploitation, the number of visitors to these mountains is also steadily on the increase. The new brand of Himalayan mountaineer and trekker unknowingly puts some unique pressures on the system.

Trekking parties to the high mountains not only destroy the last stands of Birch and Rhododendron at the high altitudes to use as fuel wood, but they also leave behind empty cans and waste that is not biodegradable in nature. Juniper bushes are likewise used as incense in camp fires. The answer to such abuses is for all trekking parties and expeditions to carry with them to the mountains their own supplies of liquid fuel, such as kerosene or LPG. All garbage that is biodegradable should be buried in shallow pits in the ground, while that which is not likely to biodegrade should be carried back to the plains for recycling or proper disposal. Such actions, although

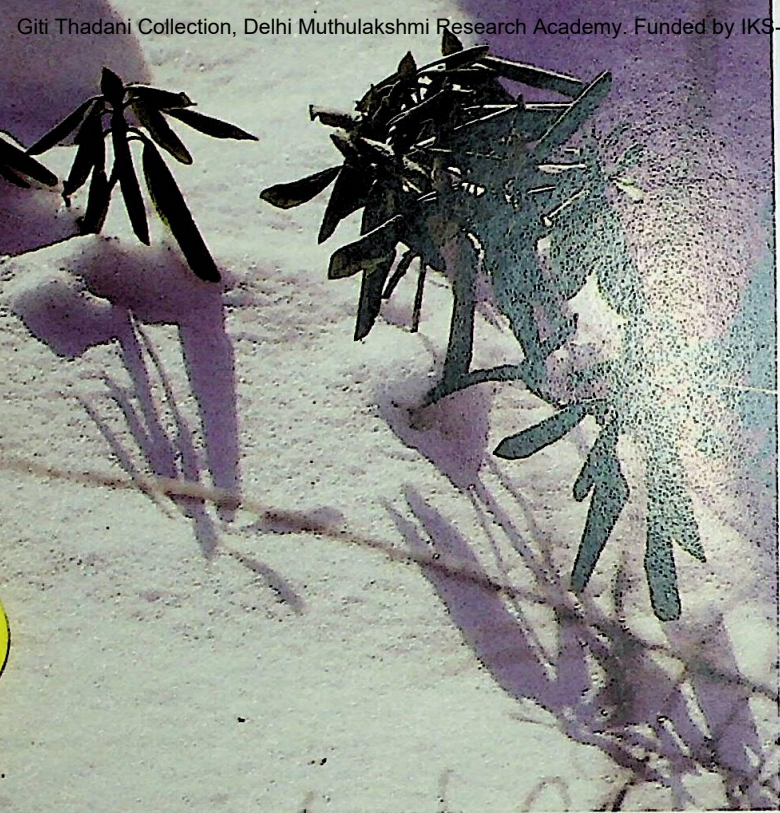


seemingly insignificant in the face of Himalayan scale, can help preserve the mountains in their pristine state not only for the enjoyment of future trekkers but for the goodness of the Himalayan ecosystems.



Himalayan flora is the chief victim of this abuse. But the biggest threat to some of our Himalayan flora comes from a different quarter. The large-scale removal of certain mountain herbs and plants of medicinal value is bringing about different changes within the mountain ecosystem. These plants, which include species of *Saussurea*, *Podophyllum*, *Geranium*, *Anemone* and *Potentilla* constitute the chief source of lean season sustenance for the high altitude fauna such as the Bharal or the Blue Sheep and the Himalayan Red Bear. These root plants, which are systematically mined from entire hill slopes and meadows in parts of Himachal Pradesh and Garhwal, are subsequently processed locally and exported for use in perfumeries and medical preparations abroad and in India.





The fauna of the alpine ecosystem depends on the tubers and roots of these plants for survival when the thick blanket of winter snow covers the hillsides, and sources of nutrition are at a premium. However, in the absence of these herbs many animals are moving away from affected regions as they are not able to sustain themselves. As a result, the chief predator of this alpine ecosystem — the Snow Leopard — is forced to move with its prey, and the animal populations get concentrated in smaller areas.

This is but one of the direct threats experienced by our alpine flora which has a direct consequence on the animals and the entire ecosystem. There are several such pressures that have built up over the years and today threaten to destroy large areas of Himalayan wilderness.

But we can do our bit to contribute to the well-being of the Himalayan environment by behaving like responsible trekkers and treading gently.

Bibliography

As this book is meant more for the first-timer in the Himalayas, much detail has been excluded and the overall coverage has been restricted to the flowering plants that the average visitor to the Western Himalayas is most likely to meet in the course of the first few visits. For more hardcore naturalists and botanists and those novices who have been bitten by the Himalayan bug, there are several fine works which allow a more detailed study of Himalayan flora. The following is a list of suggested works.

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Bistorta spp.

Hari Dang

Lilium oxypetalum, *Primula reptans*, *Potentilla* spp., *Androsace* spp.,
Anaphalis triplinervis, *Meconopsis aculeata*, *Paraquilegia microphylla*,
Potentilla atrosanguinea, *Spiraea canescens*, *Stellera chamaejasme*,
Myosotis alpestris.

Himraj Dang

Aquilegia fragrans

Rupin Dang

INTRODUCTION, PROLOGUE, *Iris kemaonensis*,
Justicia adhatoda, *Benthamidia capitata*, *Remusatia hookerana*, *Viola*
canescens, *V. Biflora* (2), *Gaultheria trichophylla*, *Fragaria nubicola*,
Podophyllum hexandrum, *Dactylorhiza hatagirea*, *Bergenia ciliata*, *B.*
stracheyi (3), *Rhododendron campanulatum* (4), *R. arboreum* (4), *R.*
anthopogon (4), *R. lepidotum*, *Caltha palustris* (4), *Allium humile*, *Morina*
longifolia, *Roscoeia purpurea*, *R. alpina*, *Cicerbita macrorhiza*, *Potentilla*
atrosanguinea (3), *P. cuneata*, *Impatiens* (2), *Geranium wallichianum* and
pratense, *Lotus corniculatus*, *Salvia lanata*, *Primula involucrata* (2), *P.*
denticulata (2), *P. petiolaris*, *P. reptans*, *P. macrophylla*, *P. edgeworthii*,
Sorbus (2), *Leontopodium* (3), *Ranunculus* (2), *Rosularia rosulata*, *Begonia*
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Aquilegia pubiflora, *Butea monosperma* (2), *Gagea elegans* (2), *Lantana*
camara (2), *Daphne bholua*, (3), *Cannabis sativa*, *Cotoneaster microphyllus*
(3), *Lloydia longiscapa*, *Delphinium denudatum* (2), *Crocus sativus*, *Aerides*
multiflora (2), *Calanthe tricarinata*, *Thermopsis barbata*, *Gloriosa superba*,
Woodfordia fruticosa (2), *Zephyranthes carinata* (2), *Cirsium*, *Commelina*
paludosa, *Gentiana*, (3), *Betula utilis* (3), *Heracleum* (2), *Aster*, *Androsace*
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Erythrina suberosa (2), *Gerbera gossypina*, *Aconitum violaceum*,
Cardiocrinum giganteum, *Polemonium caeruleum*.

Sujoy Das/Fotomedia

Rhododendron arboreum

Ashok Dilwali

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Inula spp., *Geranium* spp., *Pleurospermum candollei*, *caesalpinia*
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Capt. Ashok Kumar/Fotomedia

Bistorta vivipara

Dushyant Parashar/Pictureplus

Rosa Brunonii, *Androsace delavayi*, *Senecio* spp.

Anup Sah/Pictureplus

Osbeckia stellata

D.J. Singh/Fotomedia

Rosa macrophylla

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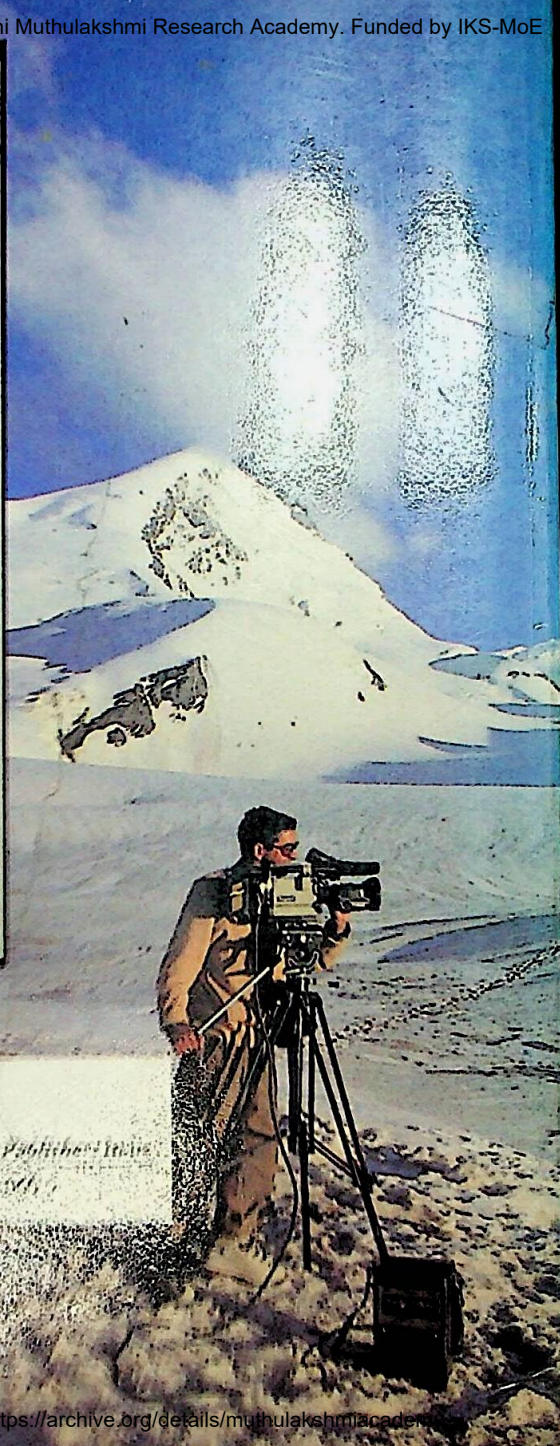
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